Appendix E

Essential Fish Habitat Assessment

DRAFT
ESSENTIAL FISH HABITAT ASSESSMENT
FOR THE PROPOSED NAVY BASE INTERMODAL CONTAINER TRANSFER FACILITY
NORTH CHARLESTON, SOUTH CAROLINA

Prepared for:
U.S. Army Corps of Engineers
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Acronyms and Abbreviations

°C	Degrees centigrade
ASMFC	Atlantic States Marine Fisheries Commission
BMP	Best Management Practices
CFR	Code of Federal Regulations
CMP	Coastal Migratory Pelagics
CNC	Charleston Naval Complex
Corps	U.S. Army Corps of Engineers
cSEL	Cumulative sound exposure level
CXS	CXS Transportation
dB	Decibel
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
FLMNH	Florida Museum of Natural History
FMP	Fishery Management Plan
FHWG	Fisheries Hydroacoustic Working Group
GMFMC	Gulf of Mexico Fisheries Management Council
HAPC	Habitat Areas of Particular Concern
HLT	Hugh K. Leatherman, Sr. Terminal
HMS	Highly Migratory Species
ICTF	Intermodal Container Transfer Facility
MAFMC	Mid-Atlantic Fishery Management Council
MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act
NCDENR	North Carolina Department of Environment and Natural Resources
NCTC	North Charleston Terminal Company
NEFSC	Northeast Fisheries Science Center
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NS	Norfolk Southern
NWI	National Wetlands Inventory
Palmetto Railways	South Carolina Department of Commerce, Division of Public Railways
ppt	Parts per thousand
RMS	Root-mean-square
ROW	Right of way
SAFMC	South Atlantic Fishery Management Council
SAFMP	South Atlantic Fisheries Management Plan
SCORE	South Carolina Oyster Restoration and Enhancement Program

SCSPA	South Carolina State Ports Authority
SEL	Sound exposure level
SPCC	Spill Prevention, Control, and Countermeasures
USFWS	U.S. Fish and Wildlife Service

1.0 INTRODUCTION

The South Carolina Department of Commerce, Division of Public Railways (Palmetto Railways or Applicant) proposes to prepare and file an application for authorization under Section 404 of the Clean Water Act, Section 103 of the Marine Protection, Research and Sanctuaries Act, and Section 10 of the Rivers and Harbor Act for construction and fill activities related to the proposed Intermodal Container Transfer Facility (ICTF) at the former Charleston Naval Complex (CNC). The proposed ICTF is located in the City of Charleston, Charleston County, South Carolina (Figure 1.1).

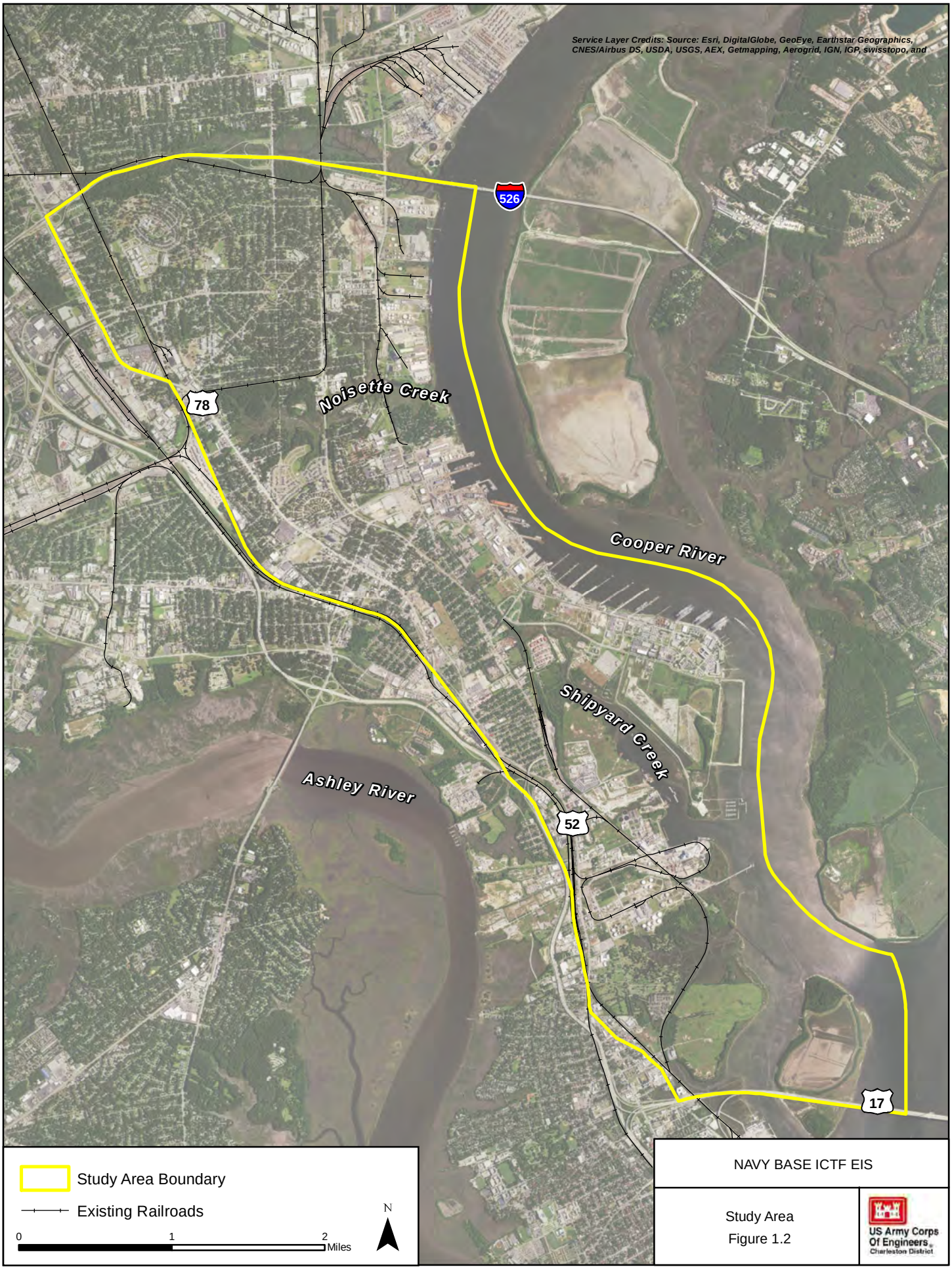
This section presents the existing conditions that will be used to evaluate the proposed project in relation to Essential Fish Habitat (EFH). The proposed study area consists of 1,196.2 acres (Figure 1.2). The purpose of the investigation was to determine the location and extent of fisheries considered to occur within the study area and those protected under the 1996 Amendment to the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), which mandated the identification of EFH for all federally managed species. This EFH Assessment is included as part of the Environmental Impact Statement (EIS) for the proposed ICTF.

1.1 ROLE OF NATIONAL MARINE FISHERIES SERVICE IN ESSENTIAL FISH HABITAT CONSULTATION

Congress enacted amendments to the MSFCMA (PL 94-265) in 1996 that established procedures for identifying EFH and required interagency coordination to further the conservation of federally managed fisheries. Rules published by NMFS (50 Code of Federal Regulations [CFR] Sections 600.805–600.930) specify that any federal agency that authorizes, funds, or undertakes, or proposes to authorize, fund, or undertake, an activity that could adversely affect EFH is subject to the consultation provisions of the MSFCMA and identifies consultation requirements. The National Marine Fisheries Service (NMFS) provided initial comments to the U.S. Army Corps of Engineers (Corps) in a letter dated April 23, 2014 that identified EFH in the study area for the Proposed Project (Attachment A). This EIS serves to further consultation with NMFS.

EFH is defined as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." The definition for EFH may include habitat for an individual species or a group of species, whichever is appropriate within each Fisheries Management Plan (FMP). EFH is separated into estuarine and marine components. The estuarine component is defined as "all estuarine waters and substrates (mud, sand, shell, rock, and associated biological communities); sub-tidal vegetation (seagrasses and algae); and adjacent intertidal vegetation (marshes and mangroves)." The marine component is defined as "all marine waters and substrates (mud, sand, shell, rock, and associated biological communities) from the shoreline to the seaward limit of the Exclusive Economic Zone" (Gulf of Mexico Fisheries Management Council [GMFMC] 2004).


South Carolina
EFH Study Area
N
0
2
4
Miles
NAVY BASE ICTF EIS
Location Map
Figure 1.1
US Army Corps
Of Engineers
Charleston District


Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and
526
78
Noisette Creek
Cooper River
Shipyard Creek
Ashley River
52
17
Study Area Boundary
Existing Railroads
0
1
2
Miles
N
NAVY BASE ICTF EIS
Study Area
Figure 1.2
US Army Corps Of Engineers
Charleston District

1.2 PROJECT DESCRIPTION

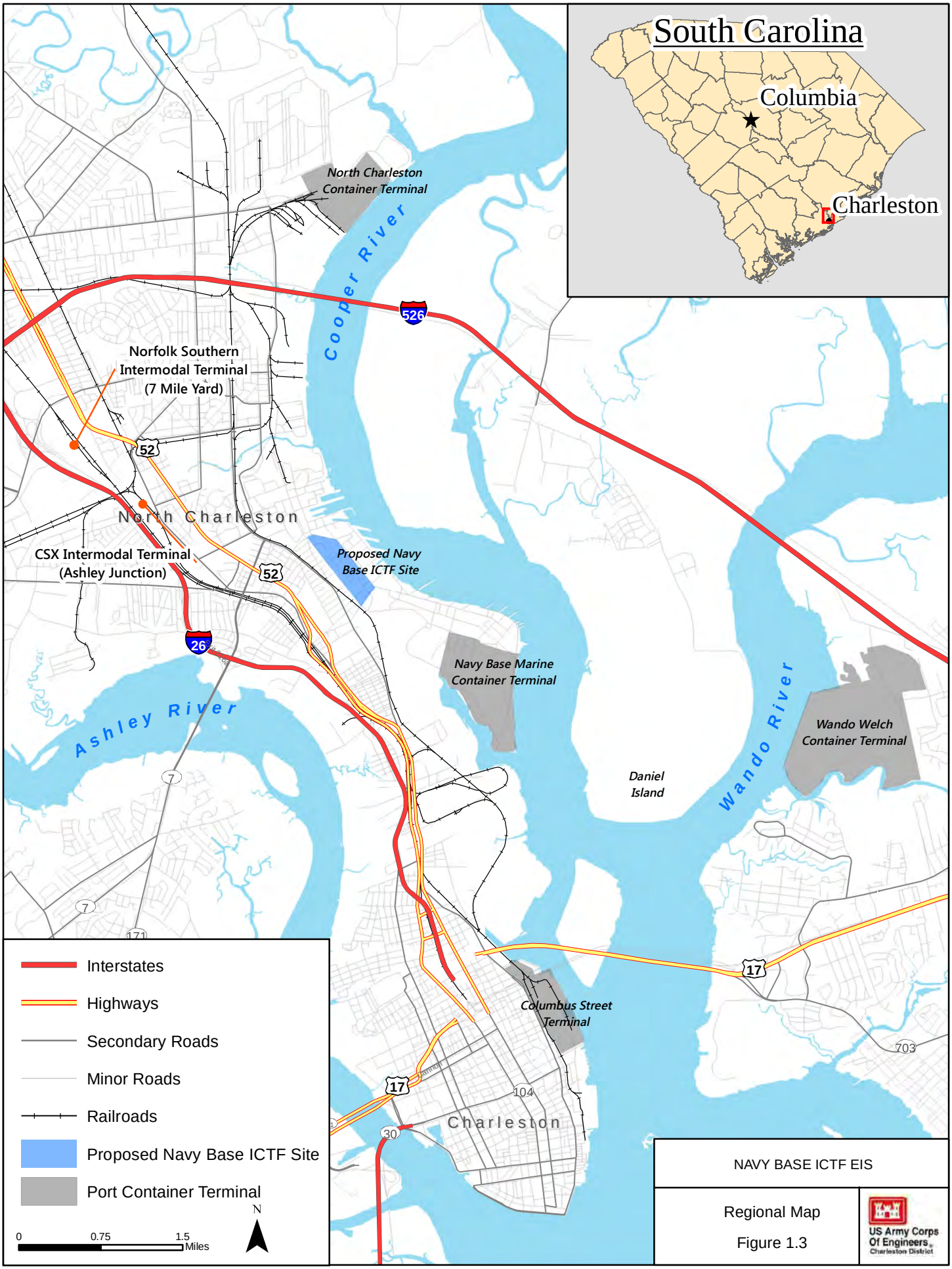
The Proposed Project, as submitted by Palmetto Railways, consists of constructing and operating an ICTF on approximately 130 acres for the facility site, and undertaking off-site roadway and rail improvements. The intermodal facility would include, but is not limited to, processing and classification railroad tracks, wide-span gantry cranes, container stacking areas, administrative buildings, and vehicle driving lanes. The off-site infrastructure improvements would include building: (1) a private drayage road approximately one mile long connecting the ICTF to the Hugh K. Leatherman, Sr. Terminal (HLT), (2) rail improvements to the north and south of the ICTF, and (3) several roadway improvements and modifications, including the construction of a new overpass. In accordance with the National Environmental Policy Act (NEPA), this EFH Assessment is part of the EIS and has been prepared to analyze and disclose the potential impacts of the project on EFH.

1.3 PROPOSED PROJECT SITE

The project site is located at the former CNC in North Charleston, South Carolina, on the former Clemson Site, and lies on the west bank of the Cooper River 6 miles north of the confluence of the Ashley and Cooper rivers. It is centrally located between several terminals operated by the South Carolina State Ports Authority (SCSPA), including the North Charleston Container Terminal, Veterans Terminal, the Navy Base Marine Container Terminal, Union Pier Terminal, Columbus Street Terminal, and the Wando Welch Container Terminal (Figure 1.3). The CNC is bounded by the Cooper River to the east, the neighborhoods of Chicora and Cherokee to the west, the Park Circle neighborhood to the north, and residential and industrial areas (e.g., the Macalloy site) to the south. The Proposed Project site is currently developed, and includes industrial buildings (e.g., high-tech, maritime, aerospace, and manufacturing facilities), a recreational facility (Sterret Hall) and associated baseball fields, warehouses, federal office buildings, private businesses, and private roads.

1.4 PROPOSED ACTION AND ALTERNATIVES

The Applicant's stated purpose and need of the Proposed Project is as follows:


South Carolina
Columbia
Charleston
North Charleston Container Terminal
Cooper River
526
Norfolk Southern Intermodal Terminal (7 Mile Yard)
52
North Charleston
CSX Intermodal Terminal (Ashley Junction)
52
Proposed Navy Base ICTF Site
26
Navy Base Marine Container Terminal
Ashley River
Wando River
Wando Welch Container Terminal
Daniel Island
7
7
171
17
Columbus Street Terminal
703
17
104
Charleston
30
Interstates
Highways
Secondary Roads
Minor Roads
Railroads
Proposed Navy Base ICTF Site
Port Container Terminal
N
0
0.75
1.5
Miles
NAVY BASE ICTF EIS
Regional Map
Figure 1.3
US Army Corps Of Engineers
Charleston District

Palmetto Railways has stated that the purpose of the Project is:

> *"To construct and operate a state-of-the-art ICTF that would provide capacity for existing and projected future growth of intermodal container traffic within the region, including increased container cargo volumes to move through the South Carolina State Ports Authority Port facilities. The Navy Base ICTF would also serve the intermodal freight rail needs throughout the Charleston region by providing equal access to both CXS Transportation (CXS) and Norfolk Southern (NS)".*

Based on information submitted by the Applicant in their proposal, and the Corps' own independent review, the Corps has completed the initial identification and evaluation of alternatives for the Navy Base ICTF. At this time, the Corps has determined that eight alternatives be evaluated in detail in this EIS (see Table 1.1). In addition to the No Action Alternative, four alternatives are associated with the Proposed Project site, and three alternatives are associated with the River Center Site. Variations of alternatives within a project site are primarily based on differing lead track alignments. Specific Proposed Project components and potential EFH impacts are identified on Figures 4.1 through 4.7

Table 1.1
Alternatives Recommended for Detailed Evaluation in the EIS

Alternative	Description
No Action Alternative	Application for DA permit would be denied; the Proposed Project would not occur; CSX and NS would undertake operational and structural modifications to Ashley Junction and 7-Mile rail yards. Future use of the Proposed Project and River Center sites would likely be mixed-use and industrial (e.g., rail-served warehousing distribution center).
Alternative 1: Applicant's Proposed Project (CSX – Southern to Milford / NS – Hospital District)	Palmetto Railways Project would be constructed and operated as proposed (Section 1.2).
Alternative 2: Proposed Project Site (CSX – Southern to Milford / NS – S-line)	A variation of the Proposed Project where the northern rail connection for NS would be relocated along Spruill Avenue within existing CSX right of way (ROW) to the S-line, and turn east along Aragon Avenue to the existing North Charleston Terminal Company (NCTC) rail line; road and rail improvements would be adjusted accordingly to facilitate rail and road traffic as a result of the NS northern rail connection alignment.

Alternative	Description
Alternative 3: Proposed Project Site (CSX – Southern to Kingsworth / NS – Hospital District)	A variation of the Proposed Project where the southern rail connection for CSX would connect to an existing CSX rail line near Kingsworth Avenue (and adjacent to existing NS rail and ROW); road and rail improvements would be adjusted accordingly to facilitate rail and road traffic as a result of the CSX southern rail connection alignments.
Alternative 4: Proposed Project Site (CSX & NS – Southern to Milford)	A variation of the Proposed Project where NS, like CSX, would also enter and exit the Navy Base ICTF from a southern rail connection, with NS connecting to an existing NS rail line near Milford Street (and adjacent to existing CSX rail and ROW). Proposed rail through the Hospital District would stop short of Noisette Creek.
Alternative 5: River Center Site (CSX – Southern to Milford / NS-Hospital District)	A variation of the Proposed Project with the project site being moved to the River Center Site; road and rail improvements would be adjusted accordingly to facilitate rail and road traffic at the new site.
Alternative 6: Alternative 6: River Center Site (CSX – Southern to Kingsworth / NS-Hospital District)	A variation of the Proposed Project with the project site being moved to the River Center Site and the southern rail connection for CSX would connect to an existing CSX rail line near Kingsworth Avenue (and adjacent to existing NS rail and ROW). Road and rail improvements would be adjusted accordingly to facilitate rail and road traffic at the new site.
Alternative 7: River Center Site (CSX & NS Southern to Milford)	A variation of the Proposed Project with the project site being moved to the River Center Site and NS, like CSX, would also enter and exit the Navy Base ICTF from a southern rail connection; road and rail improvements would be adjusted accordingly to facilitate rail and road traffic at the new site.

For the purposes of this EFH Assessment, the Applicant's Proposed Project Alternative was used to assess potential impacts. The No-Action Alternative and the other project alternatives were also carried forward for evaluation in the EIS. The No-Action Alternative assumes the Corps denial of the permit, in which construction and operation of the Proposed Project would not occur. The No-Action Alternative provides a baseline for a future-without-project conditions scenario to which the Applicant's Proposed Project can be compared.

The affected environment for EFH is comprised of four estuarine EFH categories (estuarine emergent marsh, oyster reefs/shell banks, intertidal flats or mudflats, and estuarine water column) within the study area. EFH was identified within the study area based on the review of aerial photography, GIS, literature review, National Wetlands Inventory (NWI) data, and field surveys.

Upland habitats, as well as freshwater habitats, that are not connected to tidal waters or are not tidally influenced were not considered EFH. Federally managed species and their possible life history

stages that may use the EFH within the study area are also discussed in this section. The study area for the EFH assessment includes the aquatic environments of Shipyard Creek and Noisette Creek.

2.0 EXISTING ENVIRONMENT

2.1 HABITAT/COMMUNITY TYPES

Several different watersheds ranging in size from major riverine systems to small tidal creeks encompasses the Charleston area. The Cooper River and Wando River converge north of Arthur Raven Jr. Bridge (U.S. Highway 17) and again with the Ashley River due south to become the Charleston Harbor. Additionally, Noisette Creek and Shipyard Creek are both influenced by tidal and riverine flows with outside influences such as precipitation and runoff which direct water flow. Ultimately, water flow moves south from all major river and minor tidal creek systems to the Charleston Harbor and furthermore to the Atlantic Ocean.

2.1.1 Cooper River

The Cooper River was originally a coastal plain river. It comprises a tidal estuary extending approximately 48 miles northward from its out let at Charleston Harbor to approximately 15 miles beyond the junction of its East and West Branches. The Cooper River is a tidal river influenced by several tributaries that flows past Mt. Pleasant, Charleston, North Charleston, Goose Creek, Moncks Corner, and Hanahan. The main tributaries are West Branch Cooper River, East Branch Cooper River, Back River, Filbin Creek, Noisette Creek, and Shipyard Creek. The river widens into its estuary, joining the Ashley River to form the Charleston Harbor and then flows to the Atlantic Ocean.

The Cooper River has been altered due to anthropogenic changes. Historically, the river was a tidal slough with limited freshwater inflow and extensive tidal marshes. Construction of extensive dikes in fields along the banks of the Cooper River for rice cultivation during the 18th and 19th centuries altered the marsh hydrology and salinity. The Santee-Cooper Hydro-Electric Project caused a major change to the flow regime of the Cooper River in 1941. Construction of Lake Marion and Lake Moultrie, diversion of flow from the Santee River, and discharge of flow from the Pinopolis Dam into the west branch of the Cooper River for hydroelectric generation has altered the system from a tidal slough to a riverine system. The Cooper River is currently maintained for commercial shipping.

2.1.2 Tidal Creeks

2.1.2.1 Noisette Creek

Noisette Creek is a tidal creek located on the western bank of the Cooper River and north of Charleston Harbor extending from the Cooper River approximately 1.5 miles west to Rivers Avenue. Noisette Creek averages approximately 120 feet in width. Along the main channel of Noisette Creek, smaller tidal creeks averaging approximately 30 feet in width interconnect surrounding estuarine emergent marsh wetlands. These wetlands are dominated by smooth cordgrass (*Spartina alterniflora*). During the August 2014 field surveys, oysters were observed to be scattered within the existing channel, along exposed banks, and on existing man-made structures including road bridges,

railroad bridges, and pipeline crossings. Additional fauna observed during field surveys included fiddler crab species, mud minnows, juvenile mullet, and blue crab. Noisette Creek is used recreationally for sport fishing. The existing channel consists of intertidal and subtidal unconsolidated substrates exhibiting textures that ranged from clay to sand and colors including black (GLEY 1 2.5/N) and very dark grayish brown (10YR 3/2). Attachment B, photographs 1–13 illustrate conditions in Noisette Creek during the August 2014 site visit.

2.1.2.2 Shipyard Creek

Shipyard Creek is a tidal creek located near the southernmost section of the Cooper River on the western bank. The width of Shipyard Creek varied, ranging from 10 to 200 feet wide. Associated with this tidal system is estuarine emergent marsh surrounded with forest communities along the riparian corridors where construction and development has not occurred. At the time of field surveys, the dominate vegetation observed within the estuarine marsh was smooth cordgrass and black needlerush (*Juncus roemerianus*). The surrounding forested communities consisted of live oak (*Quercus virginiana*), red cedar (*Juniperus virginiana*), loblolly pine (*Pinus teada*), sugarberry (*Celtis laevigata*), and yaupon (*Ilex vomitoria*). Field surveys confirmed the presence of submerged oyster reefs scattered within the existing channel. Fauna observed during field surveys included American alligator (*Alligator mississippiensis*), juvenile spotted seatrout (*Cynoscion nebulosus*), red drum (*Sciaenops ocellatus*), white shrimp (*Litopenaeus setiferus)*, bluefish (*Pomatomus saltatrix)*, and striped mullet (*Mugil cephalus*). The existing channel consists of intertidal and subtidal unconsolidated substrates exhibiting textures that ranged from clay to sand and dominate coloration of black (7.5YR 2.5/1). Attachment B, photographs 14–19 illustrate conditions in Shipyard Creek during the August 2014 site visit.

2.2 ESSENTIAL FISH HABITAT CATEGORIES

Field surveys were conducted by ecologists in August 2014. The scope of the EFH field survey was to capture a baseline, planning level assessment of the existing marine resources within the Project study area. The study area included two main tidal creeks; Noisette Creek and Shipyard Creek. The level of data collected during the field survey served as documentation to analyze potential impacts of the Proposed Project on existing marine resources. The data collected is intended for use during the EIS analysis phases. The EFH Assessment is intended to satisfy consultation requirements for the NMFS and other associated review agencies.

Based on reviews of aerial photography, NWI maps, and field surveys conducted by ecologists in August, four EFH categories (estuarine emergent marsh, oyster reefs/shell banks, intertidal flats, and estuarine water column) were identified within the proposed study area. Upland habitats as well as fresh water habitats that are not connected to tidal waters or are not tidally influenced were not considered EFH categories. A brief description of each community is provided below. A map of these habitats can be seen on Figure 2.1.

2.2.1 Estuarine Emergent Marsh

Typical estuarine emergent marshes within the study area were intertidal marshlands commonly found within or near river deltas that experience frequent flooding and drainage events from tidal forces that are influenced by river discharge, wind, rainfall, and lunar cycles. These marshes are known to occur in areas of higher elevation and are structured as vast expanses, in narrow fringing bands, or "pocket marshes." Marsh development typically leads to sediments with fine particle-size and high organic matter (South Atlantic Fishery Management Council [SAFMC], 1998).

Within the study area, estuarine emergent marshes are typically recognized by a nearly dominant growth of smooth cordgrass. An additional species known to occur within these habitat types is black needle rush. Estuarine emergent marshes provide habitat for species of concern in two SAFMC management plans: the red drum and shrimp fisheries. These marshes also provide habitat for other fish and invertebrates, as well as export nutrients, detritus, and prey species as ecosystem-supporting species of two additional management plans, the coastal migratory pelagic and snapper grouper fisheries. Estuarine emergent marshes prevent erosion to neighboring shorelines (SAFMC, 1998). Within the study area, estuarine emergent marshes often are homologous in vegetative composition along edges of estuaries and tidal creeks. There are approximately 208.1 acres of estuarine emergent marsh in the study area.

2.2.2 Oyster Reefs and Shell Banks

Oyster reefs and shell banks in the South Atlantic typically are observed as natural structures found in the intertidal zone or just below the intertidal zone, and are composed of oyster shell, live oysters, and other organisms. Oyster reefs and shell banks are discrete, contiguous, and clearly distinguishable from scattered oysters in marshes and mudflats. Oysters are predominantly intertidal in South Carolina.

Oyster reefs and shell banks provide important habitat for fish and other invertebrates, as well as microhabitat for smaller species. In addition, oyster reefs provide more areal coverage for attachment of oysters and other sessile organisms than occur on the surrounding intertidal flats or submerged soft bottom habitats. As a result, oyster reefs facilitate more habitat niches for aquatic species, including sponges, gastropods, polycheate worms, and decapod crustaceans (Livingston, 1990). Oyster reefs and shell banks form barriers in areas where vessels, boat traffic, and winds drive waves ashore and facilitate calmer, less-turbid waters shoreward.

The South Carolina Oyster Restoration and Enhancement Program (SCORE) is a South Carolina Department of Natural Resources community-based program focused on oyster habitat restoration and monitoring. The SCORE program restores and enhances oyster habitat by planting recycled oyster shells in intertidal habitat utilizing volunteer support. The SCORE program provides the South Carolina coastal community with an outlet to understand how oysters improve water quality, control erosion, and provide habitat for other commercially important shellfish and fish species. The SCORE

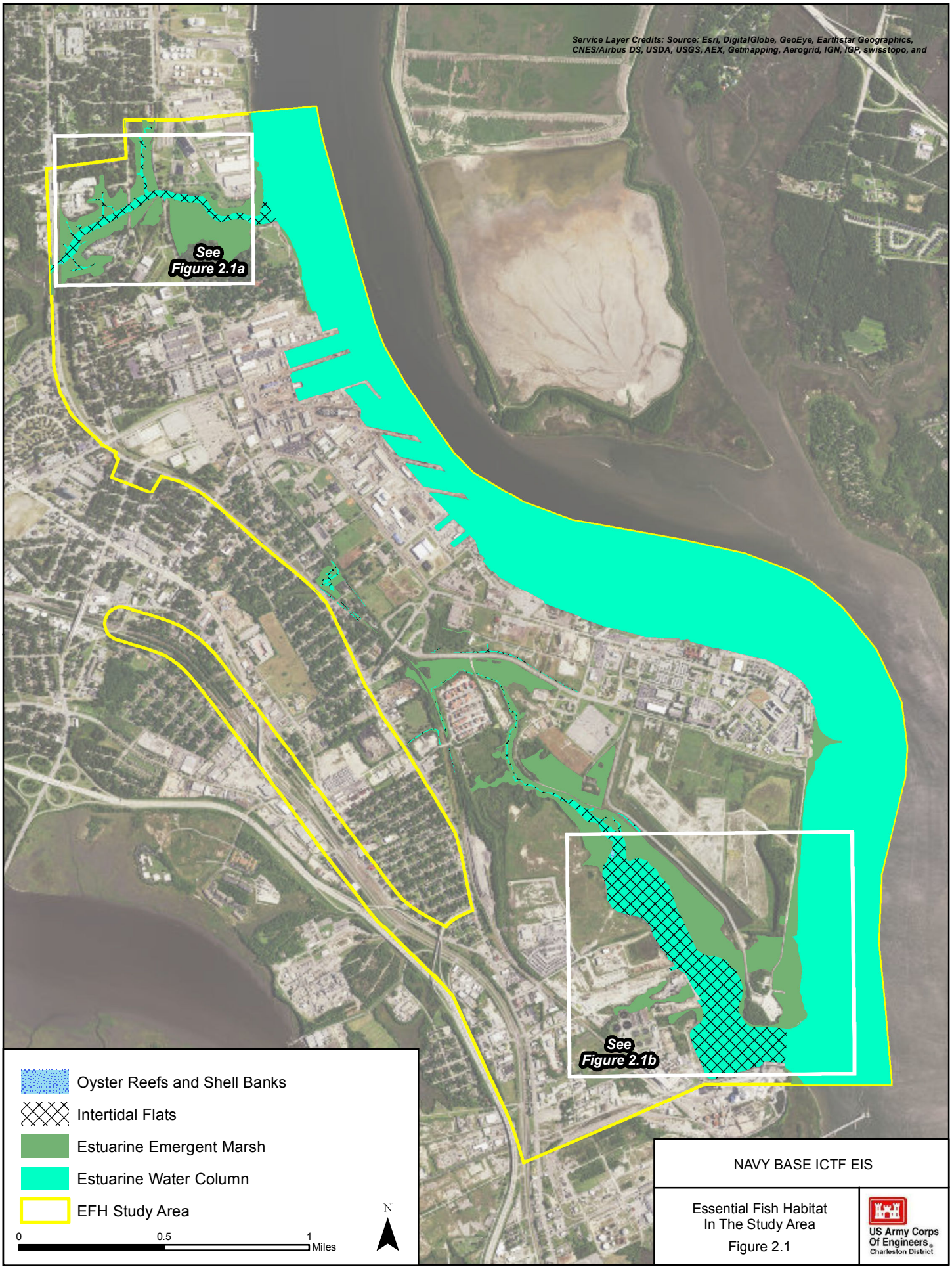
program has planted numerous oyster reef sites and has an interactive website to identify the locations and productivity of the restoration sites[1]. There are no SCORE oyster restoration sites within the study area.

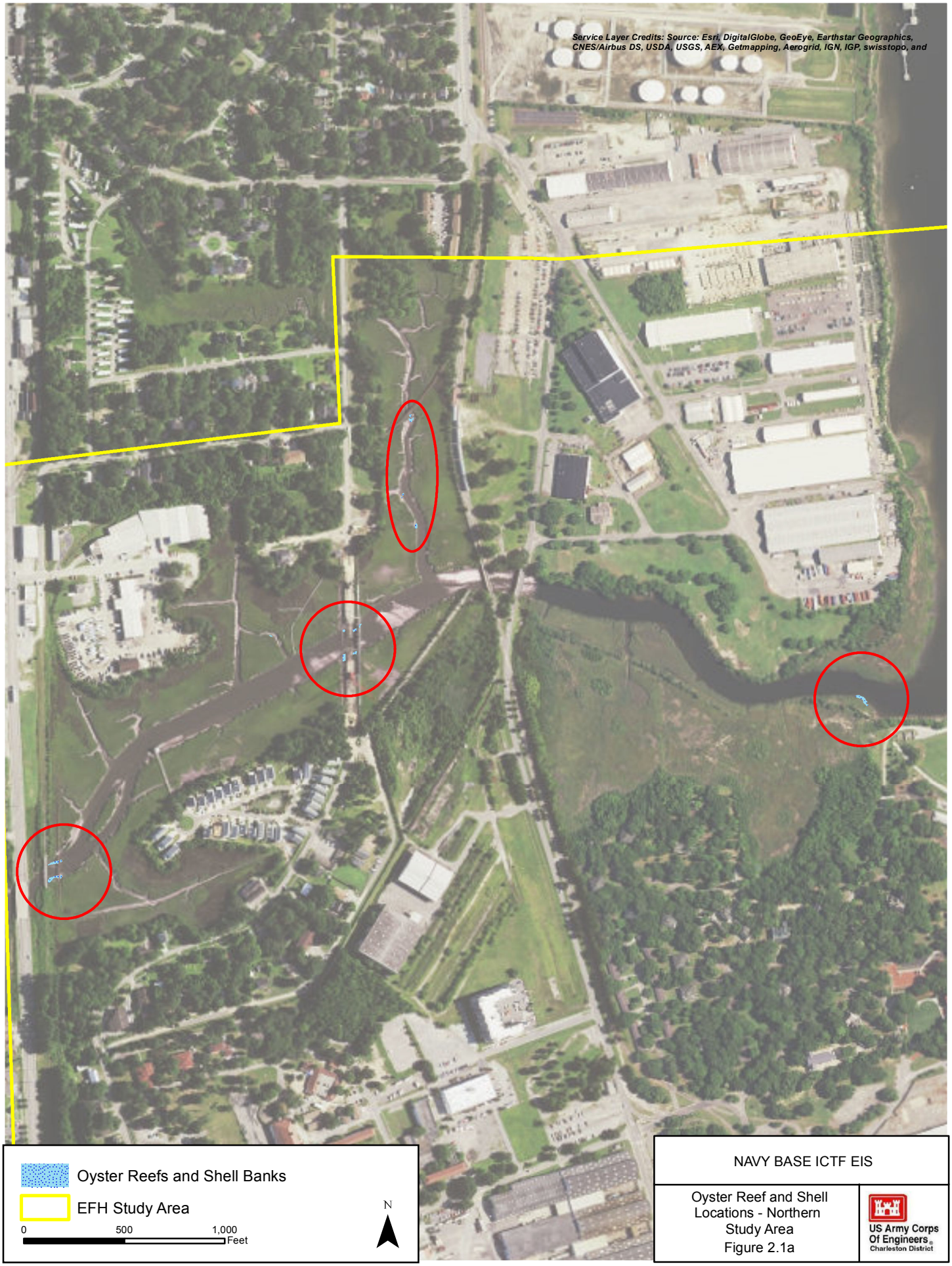
Based on field observations and publically available data for the study area, there is approximately 0.3 acre of oyster reefs and shell banks EFH within the study area as depicted on Figure 2.1. Approximately 0.1 acre of oyster reefs and shell banks are associated with Noisette Creek (Figure 2.1a) and approximately 0.2 acre of oyster reefs and shell banks are associated with Shipyard Creek (Figure 2.1b). While not considered EFH, there were occurrences of oysters on pilings associated with the current existing transportation infrastructure (e.g., railroad and vehicle bridge pilings).

2.2.3 Intertidal Flats

Individual characteristics and distribution of intertidal flats are influenced by tidal ranges, coastal geology, freshwater inflow, and weather patterns. Intertidal flats located in areas with little tidal range are primarily influenced by wind and waves. Those located in areas with large tidal ranges are primarily influenced by tidal action. Intertidal flat substrates become finer and more susceptible to wind fetch influences with increasing distance from an inlet. Intertidal flats serve as feeding grounds, refuge, and nursery areas for many different species life stages. The benthic community of an intertidal flat may include decapods, polychaetes, gastropods, and bivalves. This tidally influenced habitat provides feeding grounds for predators, juvenile, and forage fish species, as well as nursery grounds for estuarine-dependent benthic species (SAFMC, 1998). Typically, nursery areas may include unvegetated soft bottom areas surrounded by saline or brackish emergent marsh (Street et al., 2005).

[1]SCORE program website http://score.dnr.sc.gov/index.php


Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and
See Figure 2.1a
See Figure 2.1b
Oyster Reefs and Shell Banks
Intertidal Flats
Estuarine Emergent Marsh
Estuarine Water Column
EFH Study Area
0
0.5
1
Miles
N
NAVY BASE ICTF EIS
Essential Fish Habitat In The Study Area
Figure 2.1
US Army Corps Of Engineers
Charleston District


Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and
Oyster Reefs and Shell Banks
EFH Study Area
0
500
1,000
Feet
N
NAVY BASE ICTF EIS
Oyster Reef and Shell Locations - Northern Study Area
Figure 2.1a
US Army Corps Of Engineers
Charleston District


Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and
Oyster Reefs and Shell Banks
EFH Study Area
0
500
1,000
Feet
N
NAVY BASE ICTF EIS
Oyster Reef and Shell Locations - Southern Study Area
Figure 2.1b
US Army Corps Of Engineers
Charleston District

These flats can provide relatively low energy, shallow water habitat and feeding grounds (with deeper water areas depending on the tidal phase) to support species such as summer flounder (*Paralychthys dentatus*), red drum, and striped mullet. These flats also provide refuge from predators. Intertidal flats were delineated based on GIS desktop analysis and limited field assessments. There are approximately 120.4 acres of intertidal flats in the study area.

2.2.4 Estuarine Water Column

Habitats within the estuarine water column can be defined in terms of gradients and fluctuations in temperature, salinity, dissolved oxygen, turbidity, and nutrient supply. These components of the water column are variable in both time and space due to tidal fluctuations, freshwater inflows, and strong wind events. The estuarine water column serves as EFH by providing habitat for spawning, breeding, feeding, and growth for a broad array of species and life stages within species. Furthermore, the estuarine open water column serves as a transport medium for organisms between the ocean, upstream rivers, and freshwater systems where species-specific habitat components are favorable for completing particular life-stages. Zooplankton and phytoplankton are the dominant organisms in this habitat and serve as the foundation of the estuarine and marine food webs. Phytoplankton are major contributors to primary production, which is directly linked to production of biomass (macroinvertebrates and vertebrates). Many zooplankton feed on phytoplankton and are in turn eaten by small ichthyoids. In addition to supplying food for wildlife, phytoplankton plays a central role in nutrient cycling in estuarine and marine ecosystems (SAFMC, 1998). There are approximately 867.4 acres of estuarine water column in the study area.

3.0 ESSENTIAL FISH HABITAT

As described above, EFH is defined as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (16 USC 1802(10)). EFH is found in the tidally influenced or estuarine communities within the study area (see Figure 2.1). These communities play an important role in the cycling of nutrients and food energy through coastal ecosystems. Communities, such as wetlands, produce detritus that is transferred to food energy for higher trophic levels via zooplankton, bivalves, crustaceans, and small fish. The NMFS provided initial comments to the Corps in a letter dated April 23, 2014 that identified EFH in the study area and EFH for the brown shrimp (*Farfantepenaeus aztecus*) and white shrimp (*Litopenaeus setiferus*) (Attachment A).

3.1 HABITAT AREAS OF PARTICULAR CONCERN IN STUDY AREA

Within areas identified as EFH, Habitat Areas of Particular Concern (HAPC) may be designated in order to focus conservation priorities on areas that are important to the life cycles of federally managed species and may warrant more targeted protection measures. Designation of specific HAPCs are based on ecological function, habitats sensitive to human-induced environmental degradation, stressors of development activities, and habitat rarity (Dobrzynski and Johnson, 2001). The MSFCMA does not provide any additional regulatory protection to HAPCs. However, if HAPCs are potentially adversely affected, additional inquiries and conservation guidance may result during further EFH consultation with the NMFS (2008). The SAFMC has designated coastal inlets and state-designated overwintering areas of South Carolina as HAPC for white, brown, and pink shrimp.

3.2 COMMON FISH AND SHELLFISH SPECIES

The common fish and shellfish species know to occur within the EFH study area may use the various EFH habitat types at different times of the year and/or during different individual life history stages. Table 3.1 lists the common estuarine fish and shellfish species and their function/life stage uses of estuarine EFH in the study area (SAFMC, 1998).

Table 3.1
Common Fish and Shellfish Species known to use Estuarine EFH within the Study Area

Common Name	Scientific Name	Function	Life Stage(s)
Atlantic menhaden	*Brevoortia tyrannus*	R	J
Bay anchovy	*Anchoa mitchilli*	R	J, A
Weakfish	*Cynoscion regalis*		J
Spot	*Leiostomus xanthurus*	N, R, F	J, A
Red drum	*Sciaenops ocellatus*	N, R, F	PL, J, A
Atlantic croaker	*Micropogonias undulatus*	N, R, F	PL, J, A
Summer flounder	*Paralychthys dentatus*	N, R, F	PL, J, A
Southern flounder	*Paralichthys lethostigma*	N, R, F	PL, J, A
White shrimp	*Litopenaeus setiferus*	N, R, F	PL, J, A
Brown shrimp	*Farfantepenaeus duorarum*	N, R, F	PL, J, A
Pink shrimp	*Panadalus borealis*	N, R, F	PL, J
Blue crab	*Callinectes sapidus*	N, R, F	J, A
American Oyster	*Crassotrea virginica*	N, F	PL, J, A
Letter codes for function use are N = benthic nursery function, R = refuge function, and F = feeding ground function. Life stage codes are PL = post-larval, J = juvenile, and A = adult.			

Source: SAFMC (1998).

3.3 FEDERALLY MANAGED SPECIES

Fish and macroinvertebrate species of special concern that potentially occur in the vicinity of the study area include those with designated EFH and those of commercial and recreational value. In 1996, the MSFCMA mandated the identification of EFH for all federally managed species. For a list of federally managed species and their possible life history stages that may use the EFH within and adjacent to the study area, refer to Table 3.2.

As discussed above, the categories of EFH that occur within the study area include estuarine emergent marsh, oyster reefs and shell banks, intertidal flats, and estuarine water column. The following describes the preferred habitat, life history stages, and relative abundance of each of these species based on information provided by the South Atlantic Fisheries Management Plan (SAFMP, 1998).

Table 3.2
Federally Managed EFH Species Potentially Occurring within the Study Area

Common Name[1]	Scientific Name	Management Plan Agency[2]	Fishery Management Plan (FMP)[4]	Life History Stage in Study Area[3]
Penaeid Shrimp				
Brown shrimp[5]	*Farfantepenaeus aztecus*	SAFMC	Shrimp	P, J, A
White shrimp[5]	*Litopenaeus setiferus*	SAFMC	Shrimp	P, J, S
Pink shrimp[5]	*Farfantepenaeus duorarum*	SAFMC	Shrimp	P, J, S
Coastal Migratory Pelagics				
Cobia	*Rachycentron canadum*	SAFMC	CMP	L, P, J, A
Spanish mackerel	*Scomberomorus maculates*	SAFMC	CMP	J
Highly Migratory Species				
Atlantic sharpnose shark	*Rhizoprionodon terraenovae*	NMFS	HMS	J
Blacknose shark	*Carcharhinus acronotus*	NMFS	HMS	J
Bonnethead shark	*Sphyrnaa tiburo*	NMFS	HMS	J
Bull shark	*Carcharhinus leucas*	NMFS	HMS	J
Dusky shark	*Carcharhinus obscurus*	NMFS	HMS	J
Finetooth shark	*Carcharhinus isodon*	NMFS	HMS	J, A
Lemon shark	*Negaprion brevirostris*	NMFS	HMS	J, A
Sandbar shark	*Carcharhinus plumbeus*	NMFS	HMS	J
Sand tiger shark	*Odontaspis taurus*	NMFS	HMS	N
Scalloped hammerhead	*Sphyma lewini*	NMFS	HMS	J
Spinner shark	*Carcharhinus brevipinna*	NMFS	HMS	J, A
Other Managed Fish Species				
Bluefish	*Pomatomus saltatrix*	MAFMC	Bluefish	J, A
Summer flounder	*Paralichthys dentatus*	MAFMC	Summer Flounder	L, J, A

Table Notes:

[1] Based on species lists from SAFMC 1998.

[2] Fishery Management Plan Agencies: SAFMC = South Atlantic Fishery Management Council; MAFMC = Mid-Atlantic Fishery Management Council; NMFS = National Marine Fisheries Service.

[3] Life stages include: E = Eggs, L = Larvae, N = Neonate, P = Post-Larvae, J = Juveniles, S = Sub-Adults, A = Adults.

[4] Fishery Management Plans: CMP = Coastal Migratory Pelagics; HMS = Highly Migratory Species.

[5] Habitat Areas of Particular concern for shrimps includes tidal inlets, state-designated nursery and overwintering habitats

Brown Shrimp (*Farfantepenaeus aztecus*)

Brown shrimp occur from Massachusetts to the Florida Keys and west into the Gulf of Mexico and support an important commercial fishery along the south Atlantic coast, but primarily in North and South Carolina. This species spawns in deep ocean waters during late winter or early spring and larvae migrate from offshore to inshore areas as post-larvae from February through April. This

migration typically occurs at night on incoming tides, where the larvae develop into post-larvae within 10 to 17 days. The post-larvae use the soft, silty/muddy substrate common to vegetated and non-vegetated, shallow, estuarine environments.

Their diet consists of detritus, algae, and microorganisms at this developmental stage. The post-larvae stage can be found in salinity ranging from zero to 69 parts per thousand (ppt) with maximum growth reported between 18 °C and 25 °C, peaking at 32 °C. Maximum growth, survival, and efficiency of food utilization have been documented at 26 °C (Lassuy, 1983). Depending on salinities and temperatures, juveniles can develop in four to six weeks. Emergent marsh and submerged aquatic vegetation supports the highest density of post-larvae and juveniles (Howe et al., 1999; Howe and Wallace, 2000), followed by tidal creeks, inner marsh, shallow non-vegetated water, and oyster reefs.

The juvenile diets are comprised of detritus, algae, polychaetes, amphipods, nematodes, ostracods, chironomid larvae, and mysids (Lassuy, 1983). Sub-adults will emigrate from the shallow estuarine areas to deeper, open water between May through August, with June and July reported as peak months. Larger individuals will move to deeper and higher salinity waters of the inlets then move to the ocean in late fall, where they seek deeper (60-foot) offshore waters. Brown shrimp are omnivores, and although they prefer mud and peat bottoms, they can be observed on sand, silt, or clay mixed shell hash bottoms (SAFMC, 2004; North Carolina Department of Environmental and Natural Resources [NCDENR], 2006). Adults can reach maturity in offshore waters within the first year of life growing to about 5.5 to 5.7 inches long and have a maximum life span of 18 months (National Oceanic and Atmospheric Administration [NOAA], 2014a).

White Shrimp (*Litopenaeus setiferus*)

White shrimp are found along the Atlantic Coast from New York to Florida and spawn along the south Atlantic coast from March to November, with May and June reported as peak months. Spawning takes place in water greater than 30 feet in depth and within five miles of shore where they prefer salinities of greater than 27 ppt (Muncy, 1984). After the demersal eggs hatch, the planktonic post-larvae live offshore for approximately 15 to 20 days and then move inshore on tidal currents and enter estuaries two to three weeks after hatching. Benthic juvenile white shrimp prefer shallow, muddy bottoms in low to moderate salinities. The juvenile stage diet consists of zooplankton and phytoplankton. By early to mid-summer, the juveniles move to deeper creeks, rivers, and sounds and can migrate further upstream than juvenile brown shrimp; as far as 130 miles in nearby northeast Florida (Pérez-Fartante, 1969).

Being benthic omnivores they consume fecal pellets, detritus, chitin, bryozoans, sponges, corals, algae, and annelids; feeding primarily at night. Sexually mature adults emigrate to offshore waters when body size, age, and environmental conditions allow. It has been documented that a decrease in water temperature in estuaries triggers emigration in the south Atlantic (Muncy, 1984). The south-

migrating white shrimp provide a valuable fishery in southern North Carolina, South Carolina, and Georgia. The life span of white shrimp usually does not extend beyond one year (NOAA, 2014a).

Pink Shrimp (*Farfantepenaeus duorarum*)

Pink shrimp have a less common occurrence in South Carolina, but do occur along the Atlantic Coast from Chesapeake Bay south to the Florida Keys. They are most abundant in water depths of 33 to 111 feet. Pink shrimp reach sexual maturity at about 3.35 inches total length. They spawn during the early part of the summer months at depths of approximately 12 to 52 feet. The pink shrimp larval stage development (which can last from 15 to 25 days) is dependent on food, water temperature, and quality of habitat. Post-larval stage individuals may be transported via tidal currents and wind movements from the estuaries to offshore habitats (SAFMC, 2014).

Cobia (*Rachycentron canadum*)

Cobia are large, pelagic fish occurring nearshore to depths of 230 feet near artificial and natural structures, including floating objects. Spawning occurs from April through September in coastal waters. Males and females reach sexual maturity at ages 2 and 3, respectively (SAFMC, 1983; University of Florida, 2014). Cobia spawn in the warmer summer months and release eggs and sperm into offshore open waters for external fertilization. Cobia have also been documented to spawn in estuaries and bays. They can spawn once every nine to twelve days; which correlates to spawning 15 to 20 times during the season (Ditty and Shaw, 1992). Larvae emerge and move inshore to lower salinities within 24 to 36 hours after fertilization occurs.

Cobia forage primarily near the bottom, but will occasionally take prey near the surface. They typically feed on small fish, crustaceans, benthic invertebrates, and cephalopods. Young cobia appear to focus on crustaceans as opposed to feeding primarily on fish. Cobia can grow rapidly and reach lengths of 6 feet; living up to 10 years or more (Shaffer and Nakamura, 1989). Some cobia have been documented to be 14 years old for males and 13 years old for females. Adults are large powerful fish averaging 20 to 40 pounds and can reach up to 130 pounds.

Cobia larvae, post-larvae, juvenile, and adult life stages use the estuarine water column and estuarine emergent marsh EFHs within the study area for transport, refuge, and feeding grounds, as well as developmental areas.

Spanish Mackerel (*Scomberomorus maculatus*)

The Spanish mackerel is a commercially and recreationally important species in the study area. The Spanish mackerel is managed by the Atlantic States Marine Fisheries Commission (ASFMC) and the SAFMC. Spanish mackerel are found along the coastal waters of the eastern United States and the Gulf of Mexico. Data from the ASFMC and the SAFMC suggests that the Spanish mackerel population is not over-fished.

The Spanish mackerel's average adult weight is 2 to 3 pounds and can reach lengths up to 3 feet. Spanish mackerel are a fast-growing species and are capable of reproducing by the second or third year and can live 5 to 8 years (Mercer et.al., 1990; ASMFC, 2014a). Spanish mackerel move in schools of comparable-sized individuals.

Their diet consists primarily of fish, but also includes penaeid shrimp and cephalopods. Spanish mackerel seasonally migrate along the western Atlantic Coast, initiated by increasing seasonal temperatures of coastal waters moving northward from Florida to Rhode Island between late February and July (Collette and Nauen, 1983). Spanish mackerel spawn in groups over the inner continental shelf, and spawning takes place May through September with peak periods in July and August. Adult Spanish mackerel spend most of their life in the open ocean but are also found in shallow estuarine environments where prey is abundant (Pattillo et al., 1997). Spanish mackerel juveniles may use the estuarine water column and estuarine emergent marsh EFHs within the study area for foraging and refuge.

3.3.1 Highly Migratory Species

Highly migratory species include billfishes, tunas, and sharks. Of these species, sharks are the most likely to use EFHs in the study area and include the Atlantic sharpnose shark, blacknose shark, bonnethead shark, bull shark, dusky shark, finetooth shark, lemon shark, sandbar shark, sand tiger shark, scalloped hammerhead, and spinner shark. The Florida Museum of Natural History (FLMNH), which is a leading data source for Atlantic shark species, maintains an interactive website with information on the biological profiles for the highly migratory/managed shark species listed in this EFH assessment (FLMNH, 2014).

Sharks will use the inshore and estuarine habitats for foraging when inlet water temperatures are warmer than those offshore, and some may use the estuaries as nursery grounds. The juvenile life history stage is found within the study area. Sharks will forage in the benthic areas and mid and upper water column. These species are highly migratory, moving north in the spring and south in the fall along the Atlantic Coast. Sharks may use any of the specific EFHs in the study area; however, their occurrence in the study area is likely limited based on individual size and tidally influenced water depths.

3.3.2 Other Managed Species

Bluefish (*Pomatomus saltatrix*)

Bluefish are an important recreational species along the Atlantic Coast. The Bluefish Fishery Management Plan was the first management plan developed jointly by an interstate commission and a regional fishery management council (ASMFC, 2014b). Bluefish are a migratory pelagic species found along the coast from Maine to Cape Hatteras in the summer and from Cape Hatteras to Florida in winter months (ASMFC, 2014b). Bluefish have a summer and winter spawning event that results

in two distinct size groups that mix during the year making a single genetic stock (MAFMC, 2009; Northeast Fisheries Science Center [NEFSC], 2014; ASMFC, 2014b). Temperature and photoperiod are limiting factors affecting the migration and distribution of adult bluefish. Tides, weather, seasons, and prey may dictate local migrations into inlets and sounds (MAFMC, 1990).

The highly buoyant eggs are externally fertilized and released in open ocean waters, where they hatch within 48 hours (MAFMC, 1990). An EFH designation inshore for bluefish larvae has not been established, since they are not generally collected inshore (NOAA, 2014b; ASMFC, 2014b). Juveniles use mud or silty benthic habitats, as well as vegetated areas, including marsh grass beds, but prefer sandy bottom habitats. Juvenile and adult bluefish are normally found in waters less than 65 feet deep along the coast and adults use both inshore and offshore areas. Bluefish have been shown to eat almost anything they can catch and swallow including over 70 species of fish. Bluefish can live up to 12 years, reach up to 3 feet in length, and exceed 30 pounds (MAFMC, 1990; ASMFC, 2014b).

Migratory pelagic species such as bluefish depend on the estuarine systems during juvenile and adult stages. Bluefish may use the estuarine water column and estuarine emergent marsh EFHs within the study area for transport, refuge, and feeding/developmental areas.

Summer Flounder (*Paralichthys dentatus*)

The recreational and commercially important summer flounder are managed under the Summer Flounder, Scup, and Black Sea Bass Fishery Management Plan directed by the MAFMC (NMFS, 2008). The summer flounder ranges in habitats from the shallow estuarine and outer continental shelf waters from Nova Scotia to Florida to the northern Gulf of Mexico (NEFSC, 1999). Summer flounder exhibit seasonal inshore/offshore migration patterns from late spring through early fall in estuaries and sounds to migrating offshore on the outer continental shelf during the winter (NEFSC, 1999; ASMFC, 2014c). Summer flounder will spawn offshore during fall and early winter, where the larvae are carried by wind currents into coastal areas. Post-larvae and juvenile development occurs principally within the estuaries and sounds (burrowing into the sediment and developing as juveniles), where they become sexually mature at age 2 (NEFSC, 1999).

They begin with eyes on both sides of its body with the right eye migrating to the left side in 20 to 32 days post-emergence. The juveniles prey on crustaceans, copepods, and polychaetes. Their burrowing behavior is influenced by predator and prey abundance, salinity, water temperature, tides, and time of day. The juveniles often remain inshore for 18 to 20 months with the males reaching maturity at approximately 10 inches; while females reach maturity at approximately 11 inches (NEFSC, 1999; ASMFC, 2014c).

The adults primarily inhabit sandy substrates and can also be found in seagrass beds, marsh creeks, and sand flats. They are quick predators, ambushing their prey and making full use of their camouflage and bottom positioning for efficient predation on small fish and squid. Crustaceans make up a large percentage of their diet (ASMFC, 2014c; NEFSC, 1999). Tidally influenced EFH within the

study area support the larval, juvenile, and adult developmental life stages of the summer flounder (NMFS, 2008; ASMFC, 2014c).

4.0 POTENTIAL IMPACTS TO ESSENTIAL FISH HABITAT

The sections below discuss the No-Action Alternative and the potential impacts from the seven proposed project alternatives on EFH for the federally managed species and common fish and shellfish species with the potential to occur in the study area. Potential effects analyzed for each of the alternatives include direct and indirect physical, chemical, or biological alterations resulting in the reduction to quality and quantity of EFH and managed species and cumulative or synergistic consequences.

4.1 ALTERNATIVES ANALYSIS

4.1.1 No-Action Alternative

Under the No-Action Alternative, the project site and the River Center project site would continue to be used for mixed use industrial activities. While future land uses and human activities may occur adjacent to and/or within aquatic environments within the study area, it would be speculative to attempt to estimate the acreage of impacts to EFH at this time. Therefore, the acreage of impacts to EFH is unknown, but it is assumed that EFH habitat could experience an adverse impact if these future activities resulted in a reduction in quantity and/or quality of EFH habitat. While population assessments and trends of EFH species are evaluated regularly by NMFS, and the species response to management plans varies widely, future actions under the No-Action Alternative would result in a negligible adverse impact to EFH and federally managed and common fishery species (listed in Tables 3.1 and 3.2).

4.1.2 Alternative 1: Applicant's Proposed Project (CSX – Southern to Milford / NS – Hospital District)

Under the Proposed Project, construction of and/or improvements to the rail bridges adjacent to and within Noisette Creek and Shipyard Creek and construction of the drayage road and arrival/departure tracks would directly impact EFH within the study area. As such, construction activities could affect multiple life history stages of all the federally managed species identified in Table 3.2. Specific activities such as the placement of fill to construct the drayage road and pilings to complete bridge improvements would directly impact 8.95 acres of estuarine emergent marsh, 1.31 acres of intertidal flats, and 1.31 acres of the estuarine water column (Figure 4.1), which is adjacent to existing industrial land uses and is approximately 1 percent of the total EFH acreage (approximately 1,196.2 acres) in the study area.

Other sources that could impact EFH include shading from bridges, noise resulting from construction and operation activities, and temporary physical barriers from the use of best management practices (BMPs), such as floating semi-permeable turbidity curtains from pile installation in Noisette Creek

and Shipyard Creek. Underwater noise impacts to federally managed species associated with the Proposed Project are described in detail in Section 4.2.4 below.

Additionally, potential spills of contaminants may occur during construction and operation activities; however, the implementation of a Spill Prevention, Control, and Countermeasures (SPCC) Plan may minimize the impact of a potential spill event on EFH. Circulation patterns within Noisette Creek and Shipyard Creek are not expected to be altered. In summary, construction of the Proposed Project would have minor impacts to EFH and federally managed species.

Construction of the Proposed Project would result in the permanent loss of estuarine emergent marsh EFH. The loss of habitat reduces nursery areas and refuge for the federally managed and common recreational and commercial fishery species (e.g., white and brown shrimp). A reduction in marsh habitat can reduce prey opportunities, while at the same time increase predation due to the loss/reduction of cover and refuge areas. The presence of construction equipment adjacent to and/or within the EFH, and the resulting noise, may also result in the temporary displacement of federally managed species residing in this area; however, impacts to federally managed and common species that use estuarine emergent marsh EFH would be minor since the Proposed Project would not affect federally managed species at the population level.

Because of the distance between proposed construction activities under the Proposed Project Alternative and the location of oyster reefs/shell banks in the study area, there would be no direct impact on this EFH. Oyster clusters that are located on bridge pilings may be directly impacted during bridge improvements in Noisette Creek; however, this impact would be considered a temporary impact on EFH since new pilings installed in the area would provide structure for future oyster settlement and propagation. The potential for an indirect, temporary, water quality impact (e.g., sedimentation, turbidity) to the oyster reefs/shell banks EFH in the study area would be reduced to a negligible effect with the use of applicable BMPs discussed in Section 4.1 (Geology and Soils) and Section 4.3 (Water Quality) of the EIS.

The direct impact to intertidal flats EFH would be minor due to the amount of available intertidal habitat that would not be impacted by the Proposed Project within the study area. These impacts would result from the construction of the new rail bridges and include the potential for localized, temporary increases in sedimentation; permanent physical barriers to species movement from new piling installation; and temporary physical barriers to species movement from the implementation of BMPs (e.g., floating semi-permeable turbidity curtains) during construction. Loss of habitat could result in a minor impact to federally managed and common fishery species that use the EFH for foraging and refuge. Noise impacts, and the presence of nearby human activity, could also result in the temporary displacement of federally managed and common fish species that inhabit the intertidal flats EFH.

The direct impact to estuarine water column EFH would be minor due to the amount of available estuarine water column that would not be impacted by the Proposed Project within the study area. Other impacts to this EFH associated with construction of the Proposed Project include the potential for localized, temporary increases in sedimentation (and turbidity); reduced dissolved oxygen levels; permanent physical barriers to species movement from new piling installation; and temporary physical barriers to species movement from the implementation of BMPs (e.g., floating semi-permeable turbidity curtains) during construction. Increases in sedimentation and turbidity may result in a minor adverse impact to federally managed and common fishery species and the estuarine food chain, but any potential impacts would be minimized through the use of BMPs discussed in Section 4.1 (Geology and Soils) and Section 4.3 (Water Quality) of the EIS.

4.1.3 Alternative 2: Proposed Project Site (CSX – Southern to Milford / NS – S-line)

Alternative 2 is a variation of the Proposed Project where the northern rail connection for NS would be relocated along Spruill Avenue within existing CSX ROW to the S-line, and turn east along Aragon Avenue to the existing NCTC rail line. Alternative 2 would require a bridge crossing of Noisette Creek adjacent to Spruill Avenue, rather than near Noisette Boulevard. The placement of fill and pilings associated with construction of Alternative 2 would directly impact 10.24 acres of estuarine emergent marsh, 0.03 acre of oyster reefs/shell banks, 1.34 acres of intertidal flats, and 1.34 acres of the estuarine water column (Figure 4.2).

4.1.4 Alternative 3: Proposed Project Site (CSX – Southern to Kingsworth / NS – Hospital District)

Under Alternative 3, the intermodal facility would include all of the facility components of the Proposed Project, and road improvements would be the same as those identified in the Proposed Project. The arrival/departure design would be the same as described in the Proposed Project; however, the southern rail connection for CSX would connect to an existing CSX rail line near Kingsworth Avenue (and adjacent to existing NS rail and ROW), which would require acquisition of a new ROW. The placement of fill and pilings associated with construction of Alternative 3 would directly impact 9.11 acres of estuarine emergent marsh, 1.34 acres of intertidal flats, and 1.34 acres of the estuarine water column (Figure 4.3).

4.1.5 Alternative 4: Proposed Project Site (CSX & NS – Southern to Milford)

Under Alternative 4, the intermodal facility would include all of the facility components of the Proposed Project, and road improvements would be the same as those identified in the Proposed Project. Rail improvements would be similar to those described for the CSX southern rail connection as part of the Proposed Project, with the exception that a second track would need to be constructed for NS, which would then tie into the existing NS rail lines. To the north of the intermodal facility, a rail spur or tail track is proposed to extend from the facility through the Hospital District but would

stop short of Noisette Creek. The placement of fill and pilings associated with construction of Alternative 4 would directly impact 8.04 acres of estuarine emergent marsh, 1.02 acres of intertidal flats, and 1.02 acres of the estuarine water column (Figure 4.4).

4.1.6 Alternative 5: River Center Site (CSX – Southern to Milford / NS-Hospital District)

Alternative 5 is a variation of the Proposed Project with the project site being moved to the River Center Site. The intermodal facility would include all of the facility components of the Proposed Project, with the exception that a sound attenuation and security wall would be constructed adjacent to Noisette Boulevard along the length of the eastern boundary of the facility site. To accommodate NS rail access, a new rail bridge would be constructed similar to the one described under the Proposed Project. The NS rail connection would cross Noisette Creek and tie into the existing NCTC tracks along Virginia Avenue. The placement of fill and pilings associated with the construction of Alternative 5 would directly impact 9.41 acres of estuarine emergent marsh, 1.10 acres of intertidal flats, and 1.10 acres of the estuarine water column (Figure 4.5).

4.1.7 Alternative 6: River Center Site (CSX – Southern to Kingsworth / NS-Hospital District)

Under Alternative 6, the intermodal facility would include all of the facility components, road improvements, and northern rail connection as described in Alternative 5. Rail improvements would be similar to those described for the CSX southern rail connection in Alternative 5, with the exception that the southern rail connection for CSX would connect to an existing CSX rail line near Kingsworth Avenue (and adjacent to existing NS rail and ROW) and would require acquisition of new ROW. The placement of fill and pilings associated with the construction of Alternative 6 would directly impact 9.41 acres of estuarine emergent marsh, 1.02 acres of intertidal flats, and 1.02 acres of the estuarine water column (Figure 4.6).

4.1.8 Alternative 7: River Center Site (CSX & NS Southern to Milford)

Under Alternative 7, the intermodal facility would include all of the facility components of the Proposed Project, with the exception that the sound attenuation and security wall would be constructed adjacent to Noisette Boulevard along the length of the eastern boundary of the site. Operational activities and roadway improvements for Alternative 7 would be the same as those described under Alternative 5 with the exception of the NS rail access which would enter and exit the Navy Base ICTF from a southern rail connection. Rail improvements and modifications would be similar to those described under Alternative 5. The placement of fill and pilings associated with the construction of Alternative 7 would directly impact 8.33 acres of estuarine emergent marsh, 0.86 acre of intertidal flats, and 0.86 acre of the estuarine water column (Figure 4.7).

4.1.9 Related Activities

The Related Activity includes two components, the Southern Rail Connection to existing CSX, which occurs for all alternatives, but has unique alignments for Alternatives 3 and 6, and the Northern Rail Connection to Norfolk Southern, which is only proposed for Alternative 2. Despite the unique rail alignments for Alternatives 3 and 6, impacts to EFH for those sections have been successfully avoided. Under Alternative 2, the placement of pilings associated with construction of the Related Activity (a new railroad bridge across a portion of marsh that drains Noisette Creek) would directly impact 1.60 acres of estuarine emergent marsh, 0.007 acre of oyster reefs/shell banks, 0.20 acre of intertidal flats, and 0.20 acre of the estuarine water column. No other impacts to EFH are anticipated from construction of the Related Activity associated with each of the other project alternatives.


Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and
Intertidal Flats
Estuarine Emergent Marsh
Estuarine Water Column
Proposed Project
EFH Study Area
N
0
0.5
1
Miles
NAVY BASE ICTF EIS
Essential Fish Habitat
Alternative 1: Proposed Project Site
Figure 4.1
US Army Corps Of Engineers
Charleston District


Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and
Inset
See Inset
Inset of Oyster Reefs and Shell Banks
Oyster Reefs and Shell Banks
Intertidal Flats
Estuarine Emergent Marsh
Estuarine Water Column
Proposed Project
EFH Study Area
0
0.5
1
Miles
N
NAVY BASE ICTF EIS
Essential Fish Habitat
Alternative 2: Proposed
Project Site
Figure 4.2
US Army Corps
Of Engineers
Charleston District


Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and
Intertidal Flats
Estuarine Emergent Marsh
Estuarine Water Column
Proposed Project
EFH Study Area
0
0.5
1
Miles
N
NAVY BASE ICTF EIS
Essential Fish Habitat
Alternative 3: Proposed
Project Site
Figure 4.3
US Army Corps
Of Engineers
Charleston District


Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and
Intertidal Flats
Estuarine Emergent Marsh
Estuarine Water Column
Proposed Project
EFH Study Area
0
0.5
1
Miles
N
NAVY BASE ICTF EIS
Essential Fish Habitat
Alternative 4: Proposed
Project Site
Figure 4.4
US Army Corps
Of Engineers
Charleston District


Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and
Intertidal Flats
Estuarine Emergent Marsh
Estuarine Water Column
River Center Site
EFH Study Area
0
0.5
1
Miles
N
NAVY BASE ICTF EIS
Essential Fish Habitat
Alternative 5: River Center Site
Figure 4.5
US Army Corps Of Engineers
Charleston District


Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and
Intertidal Flats
Estuarine Emergent Marsh
Estuarine Water Column
River Center Site
EFH Study Area
0
0.5
1
Miles
N
NAVY BASE ICTF EIS
Essential Fish Habitat
Alternative 6: River Center Site
Figure 4.6
US Army Corps Of Engineers
Charleston District


Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and
Intertidal Flats
Estuarine Emergent Marsh
Estuarine Water Column
River Center Site
EFH Study Area
0
0.5
1
Miles
N
NAVY BASE ICTF EIS
Essential Fish Habitat
Alternative 7: River Center Site
Figure 4.7
US Army Corps Of Engineers
Charleston District

4.2 POTENTIAL IMPACTS TO EFH

4.2.1 Estuarine Emergent Marsh

Potential direct and indirect impacts to estuarine emergent marsh EFH would occur from implementation of all the proposed build alternatives, including the Applicant's Proposed Project Alternative. The extent of direct impacts to estuarine emergent marsh EFH would depend on the specific infrastructure design for the rail bridges and construction of the drayage road and arrival/departure tracks for each of the project alternatives. Potential effects could result from the installation of pilings, shading, noise, permanent physical barriers to movement from pilings, temporary physical barriers from BMPs (e.g., floating semi-permeable turbidity curtains), reduced prey opportunities, and reduced protection (cover) from predators.

4.2.2 Oyster Reefs and Shell Banks

Potential direct impacts to oyster reefs and shell banks EFH would occur from implementation of the Proposed Project and the Related Activity associated with Alternative 2. However, there would be beneficial impacts to oyster reefs and shell banks EFH with the creation of additional habitat from bridge improvements. There is only 0.3 acre of oyster reefs and shell banks EFH within the study area. Turbidity within the water column during construction activities may increase suspended materials causing the relative productivity of the reefs to decrease due to reduced pytoplankton/zooplankton production. However, these effects would likely be nonexistent or short in duration and have minimal effects to oyster reefs and shell banks EFH with the use of appropriate BMPs. The scattered occurrence of oyster reefs throughout the study area is the result of the limited appropriate hard substrate found within the study area for reef formation. Most accumulations of oyster reef formation were observed to be on the existing roadway infrastructure (pilings).

4.2.3 Intertidal Flats

Potential direct and indirect impacts to intertidal flats EFH would occur from implementation of all the proposed build alternatives, including the Applicant's Proposed Project Alternative. Intertidal flats are in the same area as the open water features identified within the study area. Potential effects could result from the installation of pilings, shading, noise, permanent physical barriers to movement from pilings, temporary physical barriers from BMPs (e.g., floating semi-permeable turbidity curtains), reduced prey opportunities, and reduced protection (cover) from predators. The EFH intertidal flat ecosystem provides important functions due to the areas significant tidal regime

4.2.4 Estuarine Water Column

Potential direct and indirect impacts to estuarine water column EFH would occur from implementation of all the proposed build alternatives, including the Applicant's Proposed Project. The estuarine water column EFH is used by federally managed species and their prey for foraging

and migration. Water quality is a particular concern of this important habitat. Effects on the estuarine water column may occur during construction activities and longer term use of the infrastructure. Potential effects could result from reduced dissolved oxygen levels, altered flow patterns, increased turbidity, permanent physical barriers to movement from pilings, temporary physical barriers from BMPs (e.g., floating semi-permeable turbidity curtains), and changes in salinity/chemistry. Maintaining appropriate construction BMPs would reduce potential impacts to the managed species.

Underwater noise from the installation of pilings associated with the Proposed Project could have direct and indirect effects on the estuarine water column EFH. Underwater pile driving activities have the potential to produce high intensity sound pressure underwater, which could cause injurious or lethal impacts to fish (Caltrans, 2001; Hastings and Popper, 2005; Popper and Hastings, 2009). High pressure waves from underwater noise can pass through fish, causing the swim bladder to be rapidly squeezed and then rapidly expanded as the sound wave passes through the fish. Other impacts may include the rupture of capillaries in internal organs as indicated by observed blood in the abdominal cavity, and maceration of the kidney tissues (Caltrans, 2001).

When a pile driving hammer strikes a pile, a pulse is generated that moves through the pile and radiates sound into the water, the ground, and the air. Sound pressure pulse as a function of time is classified as the waveform. These sounds are described by the peak pressure, the root-mean-square pressure (RMS), and the sound exposure level (SEL). The Fisheries Hydroacoustic Working Group (FHWG), a multi-agency work group, developed criteria for the acoustic levels at which various physiological effects to fish could be expected (FHWG, 2008). The criteria were developed primarily for species on the west coast of the United States; however, the NMFS and U.S. Fish and Wildlife Service (USFWS) have relied on these criteria for assessing projects on the east coast and the Gulf of Mexico for sound effects analysis (USFWS, 2015). The FHWG determined that peak sound pressure waves should be within a single strike threshold of 206 decibel (dB), and the cumulative sound exposure level (cSEL) associated with a series of pile strike events should be less than 187 dB cSEL to protect listed fish species that are larger than 2 grams, and less than 183 dB cSEL for fish species that are smaller than 2 grams (FHWG, 2008).

The Proposed Project includes the installation of approximately 130 pre-stressed concrete piles for construction of the proposed rail and road bridges. The proposed piles would be 60 feet long and consist of approximately 80, 20-inch diameter, pre-cast concrete piles for the Noisette Creek rail bridge; and approximately 50, 24-inch diameter, pre-cast concrete piles for the Shipyard Creek road bridge. The proposed installation plan estimates driving 10 piles per day in approximately 4.5 feet of water for Noisette Creek and 0 to 1 foot of water for Shipyard Creek. During construction of the Proposed Project, the work day hours are estimated to be approximately 10 hours per day, with the actual pile driving activity to be an average of 8 hours per day. Using one installation rig over a 6-day work week, it would take approximately 8 days to complete the Noisette Creek installation and 5 days to complete the Shipyard Creek installation. The estimated total number of strikes per day would be 4,000 strikes. One area would be completed before pile driving was initiated at the other pile driving site.

The NMFS Pile Driving Calculator Model was used to assess the potential underwater noise impacts from pile driving activities for the Proposed Project (NMFS, 2015). This model is based on data from similar piles in similar substrate and requires an estimate of the total number of strikes per day to install the piles. Assumptions for input into the NMFS model were based on the number of strikes proposed for the 20-inch and 24-inch diameter pre-cast concrete piles. Reference noise levels were selected from the Compendium of Pile Driving Sound Data, updated in October 2012, provided as Appendix I to Caltran's Final Technical Guidance for Assessment and Mitigation of the Hydroacoustic Effects of Pile Driving on Fish (February 2009) to represent the Proposed Project (Caltrans, 2012).

Based on the size of the piles and estimated water depths, noise generated by installation of the piles at both Noisette Creek and Shipyard Creek is estimated to be 185 dB peak, with a cumulative strike sound exposure level of 191 dB cSEL, and RMS sound levels of 166 dB. Based on a scenario of 4,000 total strikes per day, the model analysis shows that the threshold for physical injury to listed fish species that are larger than 2 grams would have the potential to be exceeded up to 62 feet from the installation sites. The threshold for physical injury to listed fish species that are smaller than 2 grams would have the potential to be exceeded up to 72 feet from the installation sites. Table 4.1 provides a summary of the NMFS Pile Driving Calculator Model outputs for this analysis.

Table 4.1
Underwater Noise Analysis for the Proposed Project

Noisette Creek - Analysis Based on 4,000 Total Strikes Per Day									
	Source sound at 4.5 feet			**Estimated Number of Strikes (total)**	**SEL, accumulated**	**Distance (feet) to threshold**			
						Onset of Physical Injury			**Behavior**
							Cumulative SEL dB*		
Pile Type	**peak sound dB**	**SEL, single strike dB**	**RMS dB**			**Peak dB (206)**	**Fish ≥2 grams (187)**	**Fish <2 grams (183)**	**RMS dB (150)**
20-inch Diameter Pre-cast Concrete	185	155	166	4,000	191	0	62	72	117
Shipyard Creek - Analysis Based on 4,000 Total Strikes Per Day									
	Source sound at 1 foot			**Estimated Number of Strikes (total)**	**SEL, accumulated**	**Distance (feet) to threshold**			
						Onset of Physical Injury			**Behavior**
							Cumulative SEL dB*		
Pile Type	**peak sound dB**	**SEL, single strike dB**	**RMS dB**			**Peak dB (206)**	**Fish ≥2 grams (187)**	**Fish <2 grams (183)**	**RMS dB (150)**
24-inch Diameter Pre-cast Concrete	185	155	166	4,000	191	0	62	72	117

dB = decibels
SEL = sound exposure level
RMS = root mean square
* This calculation assumes that single strike SELs < 150 dB do not accumulate to cause injury (Effective Quiet)

The underwater noise levels generated during pile driving of unattenuated piles would not exceed the adopted 206 dB peak criteria for injury to fish. The cSEL would minimally exceed the 187 dB criteria without an attenuation system on all piles. Thus, noise from pile driving has the potential to affect shortnose and Atlantic sturgeon in the project area.

Sturgeon are hearing generalists that do not have specialized hearing structures or use sound as part of their behavior, and therefore sturgeon are less sensitive to noise than hearing specialist species of fish. Based on study of lake sturgeon (a reasonable surrogate for shortnose and Atlantic sturgeon), sturgeon have comparatively poor hearing sensitivity (Meyer et al. 2010 and 2011 as cited in Parsons Brinckerhoff 2015), and it is likely that many of the sounds which are audible to most species are not audible to sturgeon (AKRF et al. 2012 as cited in Parsons Brinckerhoff 2015).

Krebs et al. (2013 as cited in Parsons Brinckerhoff 2015) evaluated pile driving effects on sturgeon for the Tappan Zee Pile Installation Demonstration project and found that sturgeon exhibited avoidance behavior by staying in the project vicinity for a shorter time period during pile driving activities than during silent control periods. In the Biological Opinion (BO) for the Tappan Zee Pile Installation Demonstration project, NMFS deduced that sturgeon would avoid pile driving noise and would not remain in proximity of the proposed construction area long enough to accumulate sufficient sound energy to reach the cumulative criterion. As such, given the avoidance behavior of sturgeon, cumulative exposure to pile-driving noise from that project would not affect sturgeon.

Additionally, as part of the Proposed ICTF Project, the following minimization measures will be implemented to reduce potential impacts on sturgeon to a negligible effect:

- The contractor will use air bubble curtains and/or sleeve piles during pile installation. Depending on the type of bubble curtain (e.g. confined or unconfined air bubble curtains or multiple-stage unconfined air bubble curtains) and considering the velocity of the current/tidal flow, a range of 5 to 20 dB of noise reduction could been achieved (Caltrans, 2012).
- The contractor will utilize soft-start techniques for pile driving activities. This will consist of a series of taps at 25-40% of the pile driver's energy, followed by a one-minute waiting period.

In the BO for the Tappan Zee Pile Installation Demonstration project, NMFS (2012) concurred that soft-start techniques for pile driving activities is expected to cause fish to leave the area prior to full energy pile driving, and that a soft-start method will facilitate avoidance of physical injury. Aside from Noisette and Shipyard creeks, other areas in the Cooper River provide adequate foraging and overwintering habitat that sturgeon can move into during pile driving operations. Therefore, it is not anticipated that sturgeon would be adversely affected by physical injury from peak, sSEL, and cSEL noise levels.

The use of vibratory pile driving is non-impulsive, which is not known to cause injury to marine mammals and may be used along with other underwater noise mitigation measures to reduce noise exposure to marine species. While some underwater noise exposure would be unavoidable, the following minimization measures would be implemented as part of the Proposed Project to reduce potential impacts on manatees to a negligible effect:

- During in-water work, a floating semi-permeable turbidity curtain will be deployed around areas where pile driving is taking place.
- Adherence to USFWS' standard manatee guidelines during construction (listed in Section 4.6.12 below).

Similar to sturgeon, manatees are expected to avoid the project site during pile driving activities. The semi-permeable turbidity curtain will act as a physical barrier between manatees and the project site. Therefore, it is not anticipated that manatees would be adversely affected by physical injury from in-water construction activities with the implementation of the USFWS manatee guidelines and proposed use of turbidity curtains as part of the Proposed Project.

Like manatees, sea turtles are expected to avoid the project site during pile driving activities. As discussed above for the manatee, during in-water work, should sea turtles be present, a floating semi-permeable turbidity curtain will be deployed around areas where pile driving is taking place. The turbidity curtain will act as a physical barrier between sea turtles and the project site. Noise associated with the construction work and location of work will likely deter any animals from remaining in the area extensively.

Additionally, potential impacts resulting from construction activities associated with the Proposed Project could be further minimized by adhering to environmental work windows that are established by NMFS, and further refined by the Corps, which restricts construction activities to periods when turtles are least abundant or least likely to be affected by such activities. The environmental work windows for sea turtles typically target the winter months because sea turtle abundance is dramatically reduced during colder water temperatures. Therefore, it is not anticipated that sea turtles are would be adversely affected by in-water construction activities with implementation of the above mentioned avoidance and minimization measures; thus, potential impacts on sea turtles from the Proposed Project would be negligible.

4.3 POTENTIAL IMPACTS TO FEDERALLY MANAGED SPECIES

The potential for impacts to federally managed species within the study area is likely to differ from species to species, depending upon life history, habitat use, distribution and abundance. However, construction/demolition activities of the proposed project alternatives are not likely to affect fisheries species at the population level. Therefore, permanent and/or widespread effects to managed fisheries species are not expected.

4.3.1 Direct Impacts

Table 4.2 summarizes the direct impacts to EFH from implementation of the Proposed Project. Larval, post-larval, juvenile, and adult individuals of the federally managed species listed in Table 3.2 may use EFH in the study area. Estuarine emergent marshes and other tidally influenced habitats are particularly important for feeding and refuge/development of coastal migratory pelagics. Individuals (particularly larvae and juveniles) may be incidentally taken during in-water construction activities. Additionally, turbidity, water quality, and water chemistry fluctuations may interfere with the health and behavior of managed species.

Table 4.2
Summary of Impacts to EFH from each of the Proposed Alternatives

Alternative	Habitat Loss
1: *Proposed Project: CSX – Milford / NS – Hospital District*	Minor Approximately 11.57 acres of EFH would be removed
2: *CSX – Milford / NS – S-line*	Minor Approximately 12.95 acres of EFH would be removed
3: *CSX – Kingsworth / NS – Hospital*	Minor Approximately 11.79 acres of EFH would be removed
4: *CSX & NS – Milford*	Minor Approximately 10.08 acres of EFH would be removed
5: *River Center Site: CSX – Milford / NS – Hospital District*	Minor Approximately 11.61 acres of EFH would be removed
6: *River Center Site: CSX – Kingsworth / NS – Hospital*	Minor Approximately 11.45 acres of EFH would be removed
7: *River Center Site: CSX & NS – Milford*	Minor Approximately 10.05 acres of EFH would be removed

4.3.2 Indirect Impacts

Potential indirect impacts to federally managed species that may use the EFH within the study area include a potential reduction in prey due to the mortality or displacement of benthic species associated with construction and location of the proposed in-water infrastructure. Reduced protection (estuarine emergent marsh impacts) from predators of certain life history stages of

federally managed species may also occur. However, disturbances to the benthic environment would likely be short lived and impacts negligible.

4.4 CUMULATIVE AND SYNERGISTIC IMPACTS

A cumulative impacts assessment takes into consideration the impact on the environment, which results from the incremental impact of the proposed action when added to other past, present, and reasonably foreseeable future actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. Impacts include both direct effects, which are caused by an action and occur at the same time and place as the proposed action, and indirect effects, which are also caused by the action and occur later in time and are farther removed in distance, but which are still reasonably foreseeable. Ecological effects refer to effects on natural resources and on the components, structures, and functioning of affected ecosystems, whether direct, indirect, or cumulative.

Secondary and cumulative effects to EFH within the study area from the Proposed Project and other build alternatives are difficult to predict as it is dependent on the particular alternative selected for implementation. Some of the proposed alternatives may have a higher potential to result in more secondary and cumulative effects to EFH. As discussed further in Section 5.0, appropriate BMPs and minimization measures would be implemented to ensure protection of EFH and the marine resources utilizing the EFH in and adjacent to the study area.

5.0 AVOIDANCE, MINIMIZATION AND MITIGATION MEASURES

Potential impacts associated with the Proposed Project were minimized through project planning and coordination with state and federal agencies. As part of the Proposed Project, avoidance and minimization measures would be implemented to reduce the potential impacts to EFH and federally managed species known to occur in the study area. The Applicant has committed to the following measures that would avoid and/or minimize potential impacts to EFH during project construction:

- Where possible, limit the placement of pilings for bridges within waterways, ensuring channels are not blocked.
- Require contractors to use air bubble curtains or sleeve piles to mitigate noise from pile driving activities.

The following additional mitigation measures as recommended by the Corps would further minimize and/or reduce the impacts of the proposed project alternatives on EFH.

- The contractor will utilize soft-start techniques for pile driving activities. This will consist of a series of taps at 25-40% of the pile driver's energy, followed by a one-minute waiting period.
- During in-water work, a floating semi-permeable turbidity curtain will be deployed around areas where pile driving is taking place.
- Adherence to environmental windows for construction during the winter months when sea turtles are less abundant.
- The contractor will hire a qualified marine biologist to be on-site during in-water construction activities to avoid potential impacts to marine resources and EFH.
- Implement a SPCC Plan to minimize the impact of a potential spill event on EFH.

6.0 CONCLUSIONS

The Applicant's Proposed Project would have potential direct and indirect impacts to EFH in the study area. Unavoidable impacts to EFH could be compensated through the protection and creation of marshes and oyster reefs, increasing the amount of nursery areas, creating protective habitat, and creating and protecting food sources. The creation of marshes would help to offset the loss of intertidal flats EFH, since marshes provide essential habitat for federally managed species.

7.0 REFERENCES

Atlantic States Marine Fisheries Commission (ASMFC). 2014a. Managed Species Spanish Mackerel, Species Profile. Washington, D.C. http://www.asmfc.org/ (accessed September 2014).

———. 2014b. Managed Species Bluefish, Species Profile. Washington, D.C. http://www.asmfc.org/ (accessed September 2014).

———. 2014c. Managed Species Summer Flounder, Species Profile. Washington, D.C. http://www.asmfc.org/ (accessed September 2014).

Caltrans (California Department of Transportation). 2001. Fisheries impact assessment, pile installation demonstration project for the San Francisco – Oakland Bay Bridge, east span seismic safety project, August 2001. Prepared for the Federal Highway Administration, Sacramento, California and the Metropolitan Transportation Commission, Oakland, California.

———. 2012. Update to Appendix I Compendium of Pile Driving Sounds Data, in Technical Guidance for Assessment and Mitigation of the Hydroacoustic Effects of Pile Driving on Fish, Sacramento, California.

Collette, B.B. and C.E. Nauen. 1983. FAO species catalogue. Vol. 2. Scombrids of the world. An annotated and illustrated catalogue of tunas, mackerels, bonitos and related species known to date. FAO Fish. Synop., 125(2):137.

Ditty, J.G. and R.F. Shaw. 1992. Larval development, distribution, and ecology of cobia (*Rachycentron canadum*) (Family: Rachycentridae) in the northern Gulf of Mexico. Fishery Bulletin 90:668–677.

Fisheries Hydrostatic Working Group (FHWG). 2008. Agreement in Principle for Interim Criteria for Injury to Fish from Pile Driving Activities. June 12, 2008, Memorandum from National Oceanic and Atmospheric Administration Northwest and Southwest Regions, U.S. Fish and Wildlife Service Regions 1 and 8, California/Washington/Oregon Departments of Transportation, California Department of Fish and Game, and Federal Highway Administration.

Florida Museum of Natural History (FLMNH). 2014. Biological Profiles. Florida Museum of Natural History Division of Ichthyology. Gainesville, Florida. http://www.flmnh.ufl.edu/fish/Education/bioprofile.htm.

Gulf of Mexico Fisheries Management Council (GMFMC). 2004. Draft Final Environmental Impact Statement for the Generic Essential Fish Habitat Amendment to the Following Fishery Management Plans of the Gulf of Mexico (GOM): Shrimp Fishery of the Gulf of Mexico; Red Drum Fishery of the Gulf of Mexico; Reef Fish Fishery of the Gulf of Mexico; Stone Crab Fishery of the Gulf of Mexico; Coral and Coral Reef Fishery of the Gulf of Mexico; Spiny Lobster Fishery of the Gulf of Mexico and South Atlantic; Coastal Migratory Pelagic Resources of the Gulf of Mexico and South Atlantic. Gulf of Mexico Fishery Management Council, Tampa, Florida.

Hastings, M.C. and A.N. Popper. 2005. Effect of Sound on Fish. California Department of Transportation. January.

Lassuy, D.R. 1983. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (Gulf of Mexico) – brown shrimp. U.S. Fish Wildl. Serv. Div. Biol. Ser. FWS/OBS-82/11.1. U.S. Army Corps of Engineers. TR EL-82-4.

Livingston, R.J. 1990. Inshore marine habitats. In Ecosystems of Florida. R.G. Myers and J.J. Ewel, eds. University of Central Florida Press. Orlando, Florida. p. 564.

Mercer, L.P., L.R. Phalen, and J.R. Maiolo. 1990. Fishery Management Plan For Spanish Mackerel, Fisheries Management Report No. 18 of the Atlantic States Marine Fisheries Commission Washington, DC. North Carolina Department of Environment, Health, and Natural Resources Morehead City, NC and East Carolina University Department of Sociology and Anthropology Greenville, North Carolina. November 1990. http://www.asmfc.org/ (accessed September 2014).

Mid-Atlantic Fishery Management Council (MAFMC). 1990. Fishery Management Plan For the Bluefish Fishery, Prepared By Mid-Atlantic Fishery Management Council and the Atlantic State Marine Fisheries Commission in Cooperation with the National Marine Fisheries Service, the New England Fishery Management Council, and the South Atlantic Management Council. Dover, Delaware. Updated February 2009. http://www.mafmc.org/bluefish/ (accessed September 2014).

————. 2009. Species Managed. Bluefish Fishery Management Plan. Dover, Delaware. Updated September 2008. http://www.mafmc.org/mid-atlantic/species/species.htm (accessed September 2014).

Muncy, R.J. 1984. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (Gulf of Mexico) – white shrimp. U.S. Fish Wildl. FWS/OBS-82/11.20. U.S. Army Corps of Engineers. TR EL-82-4.

National Marine Fisheries Service (NMFS). 2008. Essential Fish Habitat: A Marine Fish Habitat Conservation Mandate for Federal Agencies. St. Petersburg, Florida. 21 pp. http://www.greateratlantic.fisheries.noaa.gov/hcd/finprim.pdf.

————. 2012. Biological Opinion on Tappan Zee Pile Installation Demonstration project. Northeast Region. 107 pp.

————. 2015. NMFS Ocean Acoustics. http://www.nmfs.noaa.gov/pr/acoustics/ (accessed February 2016).

National Oceanic and Atmospheric Administration (NOAA). 2014a. Fish Watch – U.S. Seafood Facts, Brown Shrimp (*Farfantepenaeus aztecus*). http://www.nmfs.noaa.gov/fishwatch/species/brown_shrimp.htm (accessed September 2014).

————. 2014b. Atlantic Bluefish, Essential Habitat Data. http://www.nero.noaa.gov/hcd/bluefish.htm (accessed September 2014).

North Carolina Department of Environment and Natural Resources (NCDENR). 2006. North Carolina Fishery Management Plan for Shrimp (NCFMPS). 2006. NCDENR Division of Marine Fisheries. April 2006. Morehead City, North Carolina. http://www.ncfisheries.net/download/shrimpfmp2004finial.pdf (accessed September 2014).

Northeast Fisheries Science Center (NEFSC). 1999. Essential Fish Habitat Source Document: Summer Flounder, (*Paralichthys dentatus*), Life History and Habitat Characteristics. Woods Hole, Massachusetts. September 1999. http://www.nefsc.noaa.gov/nefsc/publications/tm/tm151/tm151.pdf (accessed September 2014).

————. 2014. Status of Fishery Resources off the Northeastern U.S., Resource Evaluation and Assessment Division. Woods Hole, Massachusetts. http://www.nefsc.noaa.gov/sos/spsyn/op/bluefish/ (accessed September 2014).

Parsons Brinckerhoff. 2015. Biological Assessment for the Veterans Terminal Bulkhead Restoration – Charleston County, South Carolina. South Carolina Ports Authority. August 31, 2015.

Pattillo, M.E., T.E. Czapla, D.M. Nelson, and M.E. Monaco. 1997. Distribution and abundance of fishes and invertebrates in Gulf of Mexico estuaries. Vol. II: Species life history summaries. ELMR Rep. No. 11. NOAA/NOS Strategic Environmental Assessment Div. Silver Spring, Maryland. 377 pp.

Pérez-Farfante, I. 1969. Western Atlantic shrimps of the genus Penaeus. Fishery Bulletin 67(3):461-591.

Popper, A.N. and M.C. Hastings. 2009. The effects of human-generated sound on fish. *Integrated Zoology* 4:43- 52.

South Atlantic Fishery Management Council (SAFMC). 1983. Fishery Management Plan Final Environmental Impact Statement Regulatory Impact Review Final Regulations for Coastal Migratory Pelagic Resources (Mackerels) In the Gulf of Mexico and South Atlantic Region. SAFMC. Charleston SC; Gulf of Mexico Fishery Management Council Tampa FL. February 1983. http://safmc.net/Library/CoastalMigratoryPelagicsmackerel (accessed September 2014).

————. 1998. Final Habitat Plan for the South Atlantic Region: Essential Fish Habitat Requirements for Fishery Management Plans of the South Atlantic Fishery Management Council: The Shrimp Fishery Management Plan, The Red Drum Fishery Management Plan, The Snapper Grouper Fishery Management Plan, The Coastal Migratory Pelagics Fishery Management Plan, The Golden Crab Fishery Management Plan, The Spiny Lobster Fishery Management Plan, The Coral, Coral Reefs, and Live/Hard Bottom Habitat Fishery Management Plan, The Sargassum Habitat Fishery Management Plan, and the Calico Scallop Fishery Management Plan. SAFMC. Charleston, SC. 457 pp. http://www.safmc.net/ (accessed September 2014)

————. 2004. Final Amendment 6 To The Fishery Management Plan For The Shrimp Fishery of The South Atlantic Region Including A Final Supplemental Environmental Impact Statement, Initial

Regulatory Flexibility Analysis, Regulatory Impact Review, Social Impact Assessment/Fishery Impact Statement And Biological Assessment. December 2004. Charleston, South Carolina. http://www.safmc.net (accessed September 2014).

————. 2014. Fishery Ecosystem Plan of the South Atlantic Region, Volume II: South Atlantic Habitats and Species. http://www.safmc.net/resource-library/ecosystem-based-management.

Shaffer, R.V. and E.L. Nakamura. 1989. Synopsis of biological data on the cobia (*Rachycentron canadum*) (Family: Rachycentridae). NOAA Technical Report NMFS Circular 82, 21 pp.

Street, M.W., A.S. Deaton, W.S. Chappell, and P.D. Mooreside. 2005. North Carolina Coastal Habitat Protection Plan. North Carolina Department of Environment and Natural Resources, Division of Marine Fisheries, Morehead City, North Carolina. http://portal.ncdenr.org/web/mf/55 (accessed September 2014).

University of Florida. 2014. Gainesville Florida Museum of Natural History; Ichthyology. Biological Profiles; Cobia. Gainesville, Florida. http://www.flmnh.ufl.edu/fish/Gallery/Descript/cobia/cobia.html (accessed September 2014).

U.S. Fish and Wildlife Service (USFWS). 2015. State Road 30/US 98 Pensacola Bay Bridge Federal Highway Administration, Florida Department of Transportation, Escambia and Santa Rosa Counties, Florida FWS No. 04EF3000-2013-F-0264. Biological Opinion. April 8, 2015.

Appendix A

EFH Field Assessment Photographs

Navy Base Intermodal Container Transfer Facility Infrastructure
South Carolina Department of Commerce Division of Public Railways
EFH Assessment Representative Photographs

Photo 1: Mouth of Noisette Creek orientated upstream, facing west.

Photo 2: Mouth of Noisette Creek orientated downstream flowing into Cooper River, facing east.

Photo 3: Noisette Creek orientated downstream near Noisette Boulevard Bridge, facing east.

Photo 4: Noisette Boulevard bridge crossing Noisette Creek, facing west.

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Photo 5: Estuarine emergent marsh neighboring Noisette Creek, facing west.

Photo 6: Tributary tidal creek draining surrounding estuarine emergent marsh into Noisette Creek, facing north.

Photo 7: Fiddler crabs located on the bank of Noisette Creek.

Photo 8: Oyster reef located on the bank of Noisette Creek.

Photo 9: Oysters located on columns under Noisette Boulevard bridge.

Photo 10: Tributary tidal creek draining surrounding estuarine emergent marsh into Noisette Creek, facing north.

Photo 11: Oyster reef on pipeline crossing over Noisette Creek.

Photo 12: Oyster reefs within Noisette Creek.

Photo 13: Blue crab located in Noisette Creek.

Photo 14: Shipyard Creek facing downstream, facing southeast.

Photo 15: Shipyard Creek facing upstream with surfacing American alligator, facing northwest.

Photo 16: Estuarine emergent marsh neighboring Shipyard Creek, facing southeast.

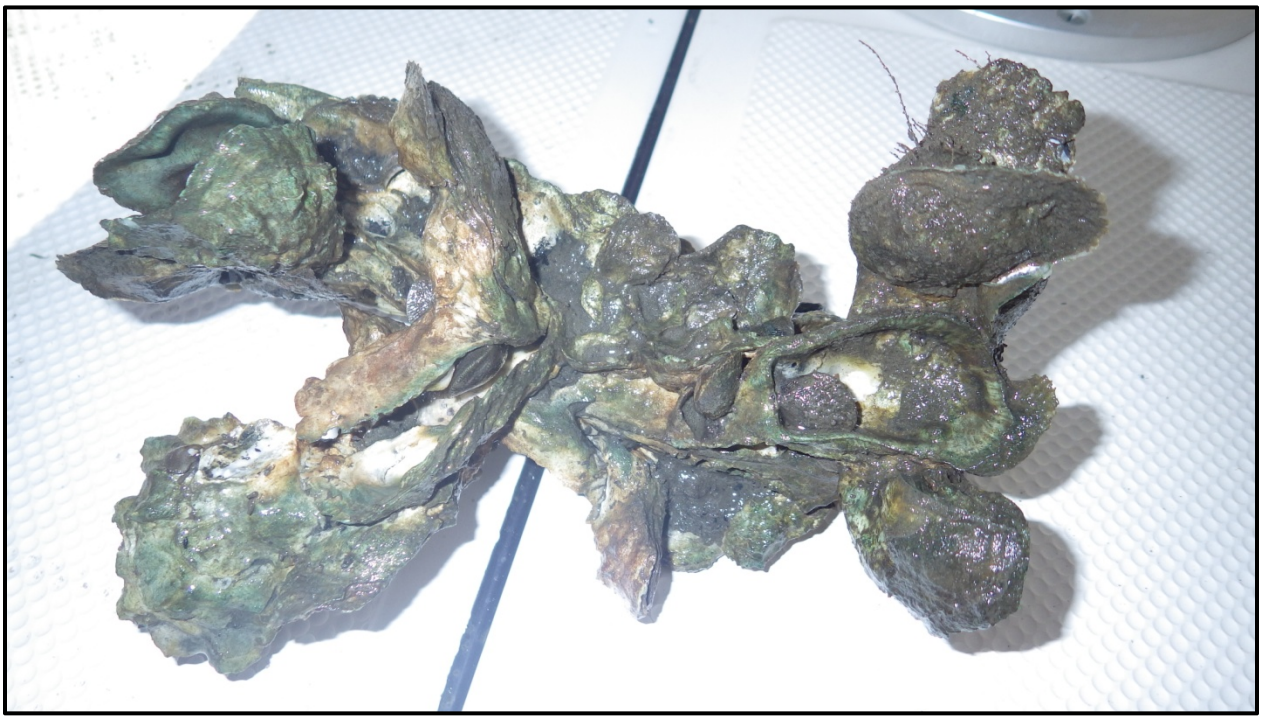


Photo 17: Submerged oysters found within the existing channel of Shipyard Creek.

Photo 18: Bluefish caught in Shipyard Creek.

Photo 19: Tributary tidal creek draining surrounding estuarine emergent marsh into Shipyard Creek, facing east

Appendix B

National Marine Fisheries Correspondence

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
263 13th Avenue South
St. Petersburg, Florida 33701-5505
http://sero.nmfs.noaa.gov

April 23, 2014 F/SER47:JD/pw

(Sent via Electronic Mail)

Lt. Col. John Litz, Commander
Charleston District, Corps of Engineers
69A Hagood Avenue
Charleston, South Carolina 29403-5107

Attention: Nat Ball

Dear Lt. Colonel Litz:

NOAA's National Marine Fisheries Service (NMFS) reviewed the U.S. Army Corps of Engineers, Charleston District's, Notice of Intent to Prepare a Draft Environmental Impact Statement for the Proposed Navy Base Intermodal Facility at the former Charleston Naval Complex, North Charleston (2012-00960), dated October 25, 2013, and the associated *Federal Register* notice dated October 23, 2013. The South Carolina Department of Commerce Division of Public Railways d/b/a Palmetto Railways has submitted a proposal to construct an Intermodal Container Transfer Facility (ICTF) at the former Charleston Naval Complex (CNC). The proposed ICTF would provide equal access to CSX Transportation and Norfolk Southern Railway, which serve the Port of Charleston and local businesses. The proposed ICTF would be designed to accommodate future intermodal growth within the region. The general comments requested in the Notice are provided below. NMFS will provide more detailed comments pursuant to its authorities under the Fish and Wildlife Coordination Act and the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) when the Draft Environmental Impact Statement is released for agency review.

Proposed Project
Palmetto Railways proposes to construct and operate an ICTF on a 90-acre site. The ICTF would include conventional terminal components, such as high-mast lighting, rail or rubber-tired mounted container cranes, and terminal hostlers. The ICTF is expected encourage development of freight-related facilities adjacent to the ICTF, including warehouses and distribution facilities.

Essential Fish Habitat
The site of the proposed project includes estuarine emergent vegetation, marsh edge, and intertidal mudflats; the South Atlantic Fishery Management Council (SAFMC) identifies these habitats as EFH for white shrimp (*Litopenaeus setiferus*) and brown shrimp (*Farfantepenaeus aztecus*). Salt marshes and intertidal mudflats are EFH because larvae and juveniles concentrate and feed extensively and shelter within these habitats. As a consequence, growth rates are high and predation rates are low, which makes these habitats effective nursery areas for shrimp. SAFMC provides detailed information on types and locations of EFH in amendments to fishery management plans and in *Fishery Ecosystem Plan for the South Atlantic Region.*

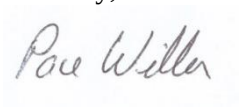
Impacts to EFH
The applicant anticipates the ICTF will adversely impact approximately 6.1 acres of tidal salt marsh and other waters of the United States associated with Noisette Creek and Shipyard Creek. The type of impact (e.g., shade vs. fill) is not identified in the notice; however, NMFS is concerned with any impacts to EFH.

With local government and state partners, NMFS has invested considerable effort in salt marsh restoration within the Noisette Creek watershed. Recently, NMFS completed restoration of 12 acres of the former Navy base golf course and constructed a living shoreline near the mouth of Noisette Creek and along the Cooper River. These are the first in a series of projects planned for the 135-acre Noisette Creek Nature Preserve. The proposed project may undermine the benefits of those conservation actions. The applicant should concentrate on avoiding and minimizing direct and impacts to EFH. Reducing runoff into the watersheds and providing a minimum vegetated buffer between all development and marsh should aid in this effort. NMFS is available to aid in development of an appropriate mitigation plan that keeps restoration efforts within the impacted watersheds after impacts are avoided and minimized to the maximum extent practical.

Finally, in accordance with section 7 of the Endangered Species Act of 1973, as amended, it is the responsibility of the lead federal agency to review and identify any proposed activity that may affect endangered or threatened species and their habitat. Determinations involving species under NMFS jurisdiction should be reported to our Protected Resources Division at the letterhead address.

We appreciate the opportunity to provide these comments. Please direct related correspondence to the attention of Ms. Jaclyn Daly-Fuchs at our Charleston Area Office. She may be reached at (843) 762-8610 or by e-mail at Jaclyn.Daly@noaa.gov.

Sincerely,



/ for

Virginia M. Fay
Assistant Regional Administrator
Habitat Conservation Division

cc:

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